

THE ZOOLOGIST.

THIRD SERIES.

VOL. VIII.]

AUGUST, 1884.

[No. 92.]

HANDS AND FEET*.

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A MAN is proverbially wanting in wit who cannot tell "a hand from a foot." Yet I would wager that not a few persons would be very much puzzled if they were suddenly called upon to say why they distinguish between "hands" and "feet," and what they really mean by those two monosyllables.

Each of the two words is used in more than one sense. We have most of us heard the expressions "a hand of pork;" "a hand at cards"; "the foot of a wine-glass"; "the foot of a mountain." The words are used in various analytical meanings, but the foundation of the analogy lies in the human hand and the human foot. With these, then, we must begin.

But every object whatever may be considered in a variety of different ways, according as we direct our minds along one or another line of thought. As, for example, a photograph of the Queen may be regarded as to its degree of likeness to Her Majesty, as a good or bad photograph technically, as a sign of royalty, as a material substance, as an object of a certain price, and in fifty other ways.

Every such object, however, as a man's hand or foot, has to be regarded from two special points of view, and such is the case with every organ of every living creature, whether animal or plant. Every such object has to be considered (1) as to its form

* An abstract of one of the "Davis Lectures," delivered at the Zoological Gardens, June 12th, 1884.

and structure, and (2) as to what it does; that is to say, it has to be regarded (1) anatomically and (2) physiologically. Anatomy concerns form and structure only, and has nothing to do with the uses or abuses to which organs or their parts may be put; it has nothing to do with activity, and its objects are by it regarded statically. Physiology concerns the action of objects only, though to know this presupposes a certain knowledge of their structure; it has in itself, however, nothing to do with form and structure, and its objects are by it regarded dynamically.

The word "hand" and the word "foot" as ordinarily used have each a certain compound reference both to form and employment—*i. e.*, both to Anatomy and Physiology. It will be necessary then to try and disentangle this involution of meanings in order to comprehend what the two words "hand" and "foot" really mean.

We will first consider some of the main characters of, and differences between, the human hand and foot considered anatomically, *i. e.*, according to their form and structure; in other words, their morphology. The hand consists (1) of the wrist, (2) of the fleshy or middle part of the hand, and (3) of the thumb and four fingers, spoken of anatomically as "digits." At the end of each digit is a nail, which covers the outer or dorsal surface of the digit. Of the digits the third is the longest, and then comes either the second or the fourth.

When we examine the bones, which constitute the firm support of the softer structures which are wrapped round them, and with them form the hand, we see that the first two constituent parts of the hand are much more distinct than they seem to be when the hand is viewed externally. For the wrist is formed of a small number (eight) of irregularly shaped short bones grouped together in two series or rows, one row of four being towards the arm, the second row being next the bones of the middle part of the hand. These small bones, which together form the wrist, are called "carpal bones," and the whole skeleton of the wrist is called the "carpus." The bones of the fleshy or middle part of the hand are five long bones, each attached to the carpus and one end, and destined to support a digit at the other. Each of these five bones is called a "metacarpal bone," and the five metacarpal bones are spoken of together as the "metacarpus." The metacarpal bone which supports the thumb, or, as it is technically termed, the "pollex," is fitted on to its

supporting carpal bone as a man rides on a saddle, each of the three adjoining surfaces being inversely concave in one direction and convex in the other. This metacarpal bone is so placed as to stand out and diverge at a marked angle from the other four metacarpals. The bones which support the digits are called phalanges, and there are three such to each digit, except the thumb (pollex), which has but two. These bones are coated with membranes, and wrapped round more or less by muscles and tendons. The muscles are the organs which move the bones as so many levers over one another, and they do so by means of tough cords or tendons which pass from the muscles to be inserted into the bones which are to be thus moved.

The human foot, like the human hand, consists of three parts:—(1) the ankle (corresponding with the wrist); (2) the fleshy or middle part of the foot (corresponding with that of the hand); and (3) the toes or five digits of the foot. At the end of each digit is a nail, which covers the upper or dorsal surface of the digit. Of the toes, the first or second is the longest, whence they decrease in length to the little toe.

When we examine the bones of the foot, we find (just as in the hand) that the first two constituent parts of the foot are more distinct than they seem to be when the foot is viewed externally. For the ankle (like the wrist) is formed of a small number (seven) of irregularly shaped small bones grouped together, interposed between the bones of the leg and those of the middle part of the foot. Of these seven bones, one (the astragalus) directly articulates with the leg bone; another, "the heel bone," is called the "os calcis"; and a third, to which for a reason (hereafter apparent) I would direct attention, is named the "naviculare." It is quite a short bone (broader than long), and none of the bones of the ankle are long bones. Each is called a "tarsal bone," and the whole skeleton of the ankle is called the "tarsus."

The bones of the fleshy or middle part of the hand are five long bones, each attached to the tarsus at one end, and destined to support a digit at the other. Each of these five bones is called a "metatarsal bone," and the five metatarsal bones are spoken of together as the "metatarsus."

The metatarsal bone which supports the great toe, or, as it is technically termed, the "hallux," is fitted on to its supporting

metatarsal bone very differently from what we find to be the case with the metacarpal of the pollex. Here there are *not* two saddle-shaped surfaces applied one to the other. The first and four succeeding metatarsals do not diverge, as do the first and four succeeding metacarpals. The bones of the digits or "phalanges" of the foot are three to each digit, except the great toe (or hallux), which, like the thumb (or pollex) has but two.

The muscles which bend or flex the toes are not only such as those which bend or flex the fingers, but there is in addition a long muscle placed on the outer side of the leg, the strong tendon of which crosses the sole (or plantar surface) of the foot obliquely to be implanted into the metatarsal of the hallux. There is nothing corresponding with this in the hand. This long muscle is called the "peroneus longus."

Let us now glance at the physiology of the hand and foot. The hand is essentially a grasping organ, and the idea of "prehension" is connected by the term "hand"—as we may see by considering such words as "handling" and "manipulation"; and therewith is associated the idea of a certain amount of skill, as evidenced by the epithet "handy."

The perfection of the human hand as an instrument is a trite subject for remark, and its powers are mainly due to the perfection with which the thumb, or pollex, can be opposed to all and to each one of the other manual digits. Were the thumb shorter than it is, the perfection of the hand as an instrument would be thereby very greatly diminished. Nevertheless the hand does occasionally serve in locomotion, as in climbing and swimming, but such employment for it is altogether exceptional and secondary.

The foot is, on the contrary, essentially an organ of locomotion and support, as we may see by such terms as "footing" and the "feet" of a stool. In the use of the foot the great toe, or hallux, is not opposed to the other digits, nor can it grasp at all, as does the thumb. Nevertheless it is of the greatest utility, serving, as the great toe does, as the fulcrum in walking. It is made so to serve by the action of the "peroneus longus" muscle, which (owing to the disposition of its strong tendon before described) tends to pull up the foot upon the great toe, and so pressing the great toe upon the ground. Nevertheless the foot does occasionally and exceptionally serve as a grasping organ, as

in some deformed people and certain savage tribes. In these, however, the great toe is not opposed to the other digits as the thumb is, though it has greater mobility and power of divariation—a thing which may be remarked in infants generally.

When we glance at the actions of other animals, we see that very different parts may be used for prehension, locomotion, and support from those which are applied to these purposes in ourselves. Thus all birds grasp with their beaks and feet, and not with the parts which correspond with our arms and hands, such parts in them being exclusively devoted to aerial locomotion. Again, Spider Monkeys not only can support themselves by their tails,—which grasp strongly enough to bear the weight of the whole body,—but will take hold of some desired object with the tail and then carry it to the hand or mouth. Mr. Bartlett has observed them to succeed in thus obtaining an object otherwise out of their reach; he has also observed the Flying Fox (*Pteropus*) take hold of food with its lower extremity, or foot, and eat from it.

The lips of the Horse and the tongue of the Giraffe are prehensile organs, but especially prehensile is that curious enormous prolongation of nose and upper lip together which constitutes the “trunk” of the Elephant. This wonderful organ has in the Indian Elephant a little finger-like process at its extremity, and it is an amazingly delicate organ for what may by analogy be well called manipulation. With these various hand-like uses for parts which are altogether different anatomically from our hands, we may contrast the assignment in other animals of parts which do anatomically answer to our hands, to the functions of locomotion and support exclusively. Such is the case as regards the anterior extremities (anatomically hands) of horses, oxen, sheep, pigs, hippopotami, rhinoceroses, elephants, &c. It is owing in fact to this exclusively locomotive use of them that such parts are commonly spoken of by us as the “fore feet” of horses, oxen, &c.

Thus disputes are inevitable (and great disputes have in fact arisen) as to what parts in non-human animals should be called “hands” and what “feet.” For example:—Seeing that the lower extremities of apes, lemurs, and opossums have a great toe which is almost or quite as opposable to the other pedal digits as is our thumb to our fingers, their extremities have very

often been called hands, and apes and lemurs have been placed in an order named *Quadrumana*, or four-handed. But, as we shall shortly see, there are apes the anterior extremities of which (anatomically answering to our hands) have no opposable thumbs, and cannot with physiological propriety be called hands. The only satisfactory way out of the difficulty is to take anatomy exclusively as our guide, and to consider every extremity scientifically a "hand" which takes the place in the body of our hand, and to call every inferior or posterior (according to the posture of the body) extremity a "foot." It is the more reasonable so to do in Zoology as zoological classification is a morphological classification, and reposes on the number and form of parts of the body, and not at all on their use and employment. When for any reason we wish to refer to such use, there will be no difficulty in occasionally speaking of a "hand devoted to locomotion" or of a "prehensile foot," as the case may be.

It will, I think, be a matter of interest if I briefly refer to some of what seem to me to be the most curious modifications in different animals of those parts which correspond with our own "hands" and "feet." In so doing, however, I shall avoid all reference to animals formed on a radically different type from that of the human body. The so-called "feet" of snails or cockles have no relation to our own any more than have the legs of flies and spiders to our own legs. I shall but refer to animals which have, as we have, a skull and backbone, two pairs—rarely one pair—of limbs, and which breathe in air. Thus I exclude from our consideration even fishes, and I do so because their fins have such a vague and remote resemblance to the extremities of the higher animals. Not but what the fins of fishes and the relations they bear to our limbs are matters full of interest and instruction. So much so, indeed, that they deserve a lecture to themselves, but space will not allow of my treating of that matter now. I have then a few words to say about the hands and feet of certain beasts, birds, and reptiles, and I will begin with those creatures which are naturally the most interesting to us, as being the most like us—I mean the Apes, and their allies the Lemurs.

Apes are divisible into two groups—(1) those of the Old World and (2) those of America. The former more closely resemble us, and their hands are for the most part roughly like ours in

structure and function; though none have so well-developed a thumb, and none can point with the index-finger. In certain Apes of Asia (*Semnopithec*i) the thumb is very small, and in closely allied African forms (*Colobi*) it is wanting altogether, being merely represented by a bony rudiment beneath the skin. The very same defect is found in certain American Monkeys (*Ateles*); but others have a thumb fairly long; in none, however, is it opposable as in man and the monkeys of the Old World, but is rather like a fifth finger, bending round nearly in the same plane as the other fingers, as may any day be seen by anyone who will give a nut to one of them in our Monkey-house. In all Apes the nails are much as in man, except in the Marmozets, where they take the form of long pointed and curved claws. As to their feet, the Apes of both worlds agree in having a great toe (or hallux) set out at an angle with the other toes, and thoroughly opposable. It no longer, as in man, serves as a fulcrum in walking, but is a most powerful grasping organ, being strongly drawn against the other toes by the action of the "peroneus longus" muscle. The hallux is never wanting, as is the pollex, but it may be very small, as in the Marmozets and Orang. It may be nailless, as in the Orang, or support the only flat nail, as in the Marmozets. In Apes, which climb so much, the hands are largely locomotive, and they may act as the lower ends of a pair of crutches, as in the anthropoid Apes which rest their knuckles on the ground in walking. Nevertheless the feet are the main locomotive and the hands the main prehensile organs, and thus physiologically as well as anatomically Apes may be said to have "two hands and a pair of feet."

The Lemurs and their allies (representatives of which groups may be found in the Monkey-house) have a certain superficial resemblance to Apes, but show one or two odd peculiarities in their extremities. Both pollex and hallux are well developed; but the index of the hand tends to be small, and may even, as in the Potto, be represented only by a minute rudiment. It is a three-fingered lemuroid. The Aye-Aye (*Chiromys*) has the middle finger much lengthened and extremely attenuated, the utility of which condition is problematical. The foot, in the Lemur, has always a sharp claw on the second digit, but in certain genera (*Galago* and *Chirogaleus*, and especially *Tarsius*) the foot is formed in a way found in no other beast whatsoever.

Instead of the tarsus consisting as in all other beasts, and in man of short bones only, the tarsal bones—the os calcis and naviculare—are so much elongated as to merit the name of long bones, and to add another segment to the limb.

Passing now to other orders of beasts, we meet with curious modifications of fingers and toes, according to the uses to which they are applied. In the most carnivorous of carnivorous animals—cats, lions, and tigers—not only are the nails in the form of exceedingly strong and curved sharp claws, but their sharpness is maintained by the arrangement of the two last phalanges of each digit. The joint between them is so formed that the last readily rolls back on the last but one, and is habitually retained in that rolled-back condition by an elastic ligament. Claws thus conditioned are said to be retractile.

The hand of the Bat is a very noteworthy organ. A Bat has a thumb and four fingers. The thumb diverges widely from the fingers, and is free, terminating in a strong hooked claw. The four fingers are exceedingly long and slender, and also bound together by a large membrane or web, which passes from the little finger to the sides of the body. It is this extensive membrane thus supported by delicate digits, like the rods of an umbrella, which constitutes the Bat's wing. The Bat's feet, on the contrary, serve little for locomotion, but the curved claws of the five moderate digits act as hooks, by which the body is habitually suspended, head downwards.

In the Mole's hand we find the very opposite condition to that of the hand of the Bat. All its component bones, instead of being long and slender, are extremely short and thick, for the Mole has to dig out the earth with extraordinary force and rapidity, the little animal proceeding on its subterranean course at such a rate, that it may be said almost to fly through the earth, instead of, as the Bat, through the air.

Progression through the water is generally accomplished in another manner, namely, by lateral strokes of the hinder part of the body. Everybody knows that in most fishes the body ends in a fin, which broadens out at the end of the tail from above downwards.

The Seal has but a very short tail, without any terminal expansion. The feet, however, are so conditioned as to act in the same way as would a vertically-expanded tail. The soles of

the feet are applied together, and the digits, which are webbed, more or less divaricated. In order to fit them for their purpose their proportions are very different from those of any foot which I have yet described. It is the first and fifth digits (the great and little toes of our feet) which are the largest and longest, while the middle toe is considerably the shortest. The hand is fitted to act as another kind of fin by a different modification. In it, it is the pollex which is the largest and longest, and thence the digits regularly decrease in size to the fifth, which answers to our little finger.

In Porpoises and Dolphins there are no feet at all, and an expansion of skin and fat only answers the swimming purpose of the feet of the Seal. The hand is made still more completely into a mere fin than is the hand of the Dolphin, its digits being all bound together in a tough and continuous investment; whereas, however, in the Seals the number of the phalanges, so constant hitherto, remains the same as in man; in the Dolphins they are augmented, those of the index finger being as many as ten or even fourteen in number.

A very curious modification of both hands and feet is met with in the Sloths. The digits are reduced in number to three, or even to two, and are singularly rigid, being bound together by membrane and skin down to the enormously long, strong, and hooked claws. The arrangement of the parts is such that when at rest they are bent over, as our hands are when our fingers are flexed. In the Sloths it requires a positive effort to open, and, as it were, unhook them; and this condition is one of the greatest utility to these animals, for Sloths pass their lives suspended from the branches of trees, on the leaves of which they feed. Moreover, they not only range about and feed in this position,—hanging back downwards—but may also sleep in the same posture. There is, however, no fear of their falling; if shot at and killed, they will still hang till they rot without falling, on account of this permanently flexed condition of their hook-like extremities.

In creatures which are not so very remotely allied to the Sloths—I mean the Ant-eaters and Armadillos—very great inequality may be found in the size of the different digits. In the Great Ant-eater, which uses the claws of its powerful fore limbs to tear down the nests of Termites, the creature walks

partly on the sides of its hands and partly on a pad-like cushion in their palms. In the Aye-Aye we find the middle digit to be exceptionally slender; in the Great Ant-eater it is most exceptionally thick and strong.

Australia is the great home of those pouched beasts, called Marsupials, one genus of which, however, inhabits America, and in ancient times was found in Europe.

The American forms (*Didelphus*), and certain Australian forms also (*Dasyurus*, *Phascogale*, and *Myrmecobius*), have the four outer digits of proportions similar to those of the majority of clawed, or unguiculate, beasts. Other Australian forms, as the Phalangiers (*Phalangista*), the native Bear* (*Phascolarctus*), the Wombat (*Phascalomys*), and others, have the second and third digits very singularly reduced in size.

This disproportion is still more marked in the Kangaroos (*Macropus*). In that animal each foot has but two large and conspicuous toes, the inner one of which is much the larger, and bears a very long and strong claw, a formidable defensive weapon when the creature stands at bay. On the inner side of this is what appears to be one very minute toe, but it is furnished with two small claws. An examination of the bones of the foot shows us, however, that it really consists of two very slender toes united together in a common fold of skin. These very minute toes are the same as the less reduced ones in the marsupials before mentioned, and correspond with our own second and third toes, there being no representative of our great toe.

In a small and very singular kind of Bandicoot (*Chæropus*) the fifth toe is also extremely reduced in size, so that the animal is supported and progresses on one toe only, namely, that which corresponds with our fourth toe. The hand of this animal is also greatly reduced in the number of its parts, though there it is supported not on one but on two digits, which correspond with the second and third digits of the human hand.

The Elephant has extremities each provided with five short digits enclosed in a plump fleshy mass, with the nails apparent,

* In the hand of this animal the pollex and index are slightly opposable to the other three digits: in the foot a nailless hallux is opposable to the other four digits.

and surrounding a dense cushion on which the limb and superincumbent weight of the body reposes.

In the Pig we have an animal each extremity of which is furnished with but four digits, both the pollex and the hallux being absent. These four digits are arranged in two pairs both on the hand and on the foot, there being a large strong pair of digits in the middle, on which the animal walks, with a small digit placed external to and behind each of the two large ones. The nails are represented by strong horny structures which encase and enclose the terminal phalanx. Such a massive sheathing nail is called a "hoof." The digits on which a Pig walks correspond with our third and fourth fingers and our third and fourth toes.

In ruminating animals, such as oxen, sheep and deer, the number of digits is reduced to two, which are the same two as as those which support the Pig in locomotion; whereas in the Pig, however, each of the metacarpals and metatarsals remains distinct. In ruminants the third and fourth metacarpals and the third and fourth metatarsals unite together to form one single bone called a "cannon bone."

In a small animal called the Jerboa (*Dipus*), which has no relation to cattle, but is allied to the rats, a still further coalescence of metatarsals takes place. This little animal has three toes (the second, third, and fourth) to each foot, and these three digits are supported by a long single metatarsal bone which really consists of the second, third, and fourth metatarsal bones united into one.

In the Rhinoceros there are also three digits to each extremity, but the metacarpals and metatarsals remain distinct.

In the Horse we meet with the extreme of reduction in regard to the number of digits, but with a great development of them in size. The popular notion is, or at all events was, that the foot of a Horse was an undivided one, that it answered to that of the Ox "uncleft." If so, the metacarpal and metatarsal bones, each of which is manifestly single, must be a "cannon" bone, and made up of more than one such bone forced, as it were, together. Such, however, is not the case; each foot of a Horse consists of but a single digit only, answering respectively to our middle finger and our middle toe, the enormously enlarged nail of such finger, or toe, having become the Horse's hoof. The Horse

therefore walks on the nails of four digits, one to each extremity, and cattle, such as oxen and sheep, walk on the nails of eight digits, two to each extremity. Such animals are said to be *Unguligrade*.

When we pass from Mammals to Birds we meet with a great change of structure. Not only is the structure of both the "hand" and the "foot" very different from anything in beasts, but the difference between the "hand" and the bird's "foot" in all birds is much greater than we find to exist in almost any beast. The "hand" of the bird is in all cases exclusively a locomotive organ, one for flight in the air, except in such a bird as the Penguin, where it is for flight in the water. The hand serves this locomotive purpose exclusively as being a support for certain feathers, and consists at the most of but three rudimentary, very short, fingers (the pollex, second and third), the metacarpals of which have united together to form a single bone. Thus the bony framework of the wing of the bird is widely different from that of the wing of the Bat. The carpus also is very small, and represented only by two small bones, the other part having coalesced with the complex metacarpal structure.

When we proceed to consider the bird's foot, we find it also a locomotive organ, but occasionally, as in the Parrots, serving as a prehensile organ, analogically—*i. e.*, according to functions—something of a hand. The foot of the bird has always as many as three digits, except in the Ostrich, where it has but two. It has never more than four digits, that answering to one's little toe being invariably absent. Generally the hallux is turned backwards and the other three forwards, but occasionally, as in the Swifts, all four may be turned forwards. Sometimes, as in the Parrots and Trogons, they may be arranged in one of two groups, two of the digits being opposed to two others. Thus the hallux and fourth may be opposed to the second and third, as in the Parrots; or the hallux and second to the third and fourth, as in the Trogons. As in mammals, so in birds, the hallux has but two phalanges, and the second digit but three. Except in a few birds (*e. g.*, the Swifts and Goatsuckers), however, the third digit has four phalanges, and the fourth has five. It is by this we know that the two toes of the Ostrich consist of the fourth and fifth digits.

The metatarsals of the foot are yet more consolidated than are the metacarpals of the hand; they form a sort of "cannon bone," like those of the Jerboa before described. Moreover, not only do they unite together, but with part of the tarsus also, the rest of the tarsus being similarly united to the lower end of the leg-bone. Thus in birds the foot does not move on the leg, as in us and in beasts, but one part of the foot moves on another, the joint between the foot and the leg being constructed in the middle of the tarsus.

In Reptiles the hand has generally five long movable digits, but they may be enclosed in a sort of fin, as in the Turtle; or greatly shortened, like those of the thick stumpy hand of the Tortoise. The phalanges of the five digits are generally 2, 3, 4, 4, 3, or 2, 3, 4, 5, 3 in number. In the foot their number is like that of birds, 2, 3, 4, 5, and the fifth digit (always absent in birds) has in Lizards four phalanges. Rarely, as in the Chameleons, the digits of both hand and foot are arranged in two bundles, opposed the one bundle to the other. Thus in the hand, the first, second, and third digits are opposed to the fourth and fifth, and in the foot the first and second digits are opposed to the third, fourth, and fifth.

In certain extinct reptiles—Pterodactyles—the hands were to a certain extent modified, like those of existing Bats, to support a flying membrane or wing. In these reptiles, however, instead of all the digits, except the pollex, being elongated, it was only the outermost one which was so. In other extinct reptiles, namely, *Ichthyosauri* and *Plesiosauri*, we have evidence of certain conditions of limb which are full of interest. The resemblance between our arm and leg and hand and foot are almost as manifest as their differences. The number of primary divisions of each, and the numerical difference of the phalanges of the innermost digits and of the other digits in each case, has been already mentioned. In many animals the difference between the hand and the foot is greater than in ourselves, but in others it is much less. In none is it so little as in *Ichthyosauri* and *Plesiosauri*, where the leg and foot is the perfect repetition behind of the arm and hand in front.

In the *Ichthyosaurus* the number of phalanges is greatly increased, but that we have met with already in Cetaceans, which seem to have been anticipated in the deep by their reptilian

precursors, the huge *Ichthyosauri*. In the latter, however, and in these only of all air-breathing back-boned animals, there are indications that the number of the digits exceeded five.

As to the lowest air-breathers referred to—the Frogs, Toads, and Efts—I will but refer to the foot of the Frog, in which we meet with a condition reminding us in a distant way of those very different animals, the Lemurs. In the Frog two of the tarsal bones are elongated, so as to merit the name of “long bones,” and to form a separate segment of the hind limbs.

To return to the question of the resemblance between “the hands” and “the feet” in the same individual. There are certain very curious facts which point to some deep and hidden cause of this resemblance of a more profound nature than any similarity of use and employment. Thus, birds present us with examples of the greatest divergence between “hands” and “feet,” and yet, at the same time, they sometimes singularly illustrate the hidden affinity between these two parts. Thus certain breeds of fowls and pigeons develop what are technically called “boots” on the feet; that is to say, their feet put forth long feathers resembling those of the wing, and they grow from the very parts of the foot which correspond, serially, with the long-feather bearing parts of the hand.

There are many curious cases of diseased conditions in man which illustrate and display this hidden affinity. Thus Sir James Paget has recorded cases in which psoriasis has similarly affected the palms of the hands and the soles of the feet in one individual, and the backs of the hands and the backs of the feet simultaneously in another individual. Analogous observations have been made by Dr. William Budd and others.

Again, those curious cases of congenital malformations called “monstrosities” also seem to illustrate this curious tendency to develop serial similarity. Professor Burt Wilder, of the United States, has noted many instances in which similar deformities have co-existed in the little fingers and in the little toes, or in the thumbs and the great toes; and M. Isidore Geoffroy St. Hilaire has recorded various cases in which similar defects of development have co-existed in the hands and feet of the same individual.

Such phenomena point to some very recondite and deeply

interesting problems, which have their *philosophical* as well as their *physical* side. Into any consideration of philosophical problems, however, I cannot here enter.

NOTES ON THE SEAL AND WHALE FISHERY OF 1883.

BY THOMAS SOUTHWELL, F.Z.S.

THE beautiful models and graphic sketches of the stirring events which characterise the pursuit of the young Seals on the Labrador ice, exhibited last summer at the International Fisheries Exhibition in South Kensington, conveyed a much more accurate impression of the mode of procedure followed in this exciting occupation than any written description, however elaborate; and from the constant interest displayed by the crowds who attentively inspected the models and drawings it is probable that many of the visitors left the building much enlightened with regard to an industry of which previously they had known next to nothing. But, however bad a time of it the poor Seals might seem to be having in the groups depicted, all seemed to be going merrily enough with the sealers, such little events as an immersion in the icy sea, or a fight with some hard-headed old "dog" only lending diversity to the scene.

There is, however, another side to the picture which no pencil could depict nor model adequately convey. Fast in the pitiless ice which tightens round her lies the good ship, her timbers groaning with the strain as though the vessel were instinct with life and feeling, the thick ice—crumpled by the pressure like sheets of paper, and its broken edges rafting one upon the other till there seems no escape from its overwhelming rush—every moment threatening to close over the shivering vessel and add one more to the list of the missing. All this time the crew, in spite of the darkness, cold, and blinding drift, are working steadily at their posts striving to relieve the ship, or preparing for a hasty flight to the ice should the worst happen; yet so capricious is the weather and the motion of the ice that a change may come at any moment, and the vessel be relieved from her perilous position. Or it may be that the majority of the crew are away on the ice; a gale comes on, and the heavy fall of snow

obliterates their tracks and hides all the surroundings by which they could guide their course to the distant vessel; those on board adopt every means to indicate the direction in which the lost ones should bend their steps; but in the snow-laden and foggy atmosphere the fog-horn and beacon-light are alike useless, and when the dawn comes and a search-party is sent out great is the suffering which they are called upon to witness—frost-bite, madness, or even death. Add to this all the privation, hard work, and liability to accident, and the sealer is surely entitled to all his hard-earned gains.

Although not so disastrous a season as that of 1882, the weather during the fishing in 1883 was quite sufficiently severe, and sometimes the vessels were very hard pressed; nevertheless the Dundee ships had a very fair catch, the six vessels averaging 15,392 Seals each, the 'Thetis' taking the lead with 22,144, the smallest number 8235 falling to the 'Arctic,' the total catch of the Dundee vessels being 92,354, against 63,204 last season. Of twenty-five other fine vessels from St. John's six returned clean, the remaining nineteen capturing between them about 194,000 Seals, or an average of 10,210 each. The very large majority of these 286,000 Seals were young "Harps"; there were also a few old and second year Harp Seals, and some Hooded Seals. The 'Aurora' also subsequently shot 2250 old Hooded Seals, and the 'Resolute' 1493 of the same species in the ice between Iceland and Greenland.

Passing to the Greenland Seal-fishery, I cannot do better than give a brief summary of the voyage of the 'Eclipse,' one of the most successful vessels of the British fleet, with the particulars of which Capt. D. Gray, her commander, has been so kind as to supply me. On the evening of the 2nd April, after a very stormy passage out, the 'Eclipse' entered the ice in $73^{\circ} 55' N.$ $5^{\circ} E.$, and joined a fleet of fifteen other British and Norwegian vessels which had also found the Seals, some of the ships having been watching the pack ever since the 28th March, waiting for the opening of the fishery, which was to take place the following morning. About 8 p.m. all was in readiness for putting the men on the ice soon after daylight the next morning. The evening was fine, and the scene pretty and peaceful in the extreme. The Seals were all Harps, and they lay basking upon the ice in all directions, engaged, with evident demonstrations of affection

and satisfaction, in administering nourishment to their pretty long-coated and large-eyed offspring, or passing to and fro between the open water and the ice, still intent on their labour of love. On this peaceful scene the arctic sun went down.

Hardly had daylight spread over the ice on the morning of the 3rd, when the ships commenced to send their men away, and by 3 o'clock there were something like 800 men on the ice, 150 of whom would be armed with rifles. Until 12 o'clock the cheers of the men, the cries of the Seals, and the crack of the rifles was incessant; after 12, as the Seals grew scarcer and the men became fagged, the noise gradually diminished, and at 8 p.m. all was quiet again.

As may be imagined, when in such large numbers and at such close quarters, quarrels, particularly between the Scotch and Norwegian sailors, were frequent, and the danger from wandering bullets was not slight; happily, however, the casualties from the latter cause were confined to one Norwegian wounded. The 4th was spent in like manner, but the men had farther to go and fewer Seals to get; and on the 5th still fewer Seals rewarded them for greatly increased labour.

The ice was now completely cleared, and on "making off" Capt. Gray found that his share was as follows:—young Harp Seals, 1470; old ditto, 354; young Hooded Seals, 322; old ditto, 2; total, 2148. As Capt. Gray abstained from the injudicious practice known as "binging,"—that is, continuing to kill the Seals so long as any are to be found and piling the pelts where they were killed, instead of bringing them at once to the ship,—he did not make up so large a total as the Norwegians, but from the reports he received from the other vessels he estimates the total number of Seals killed by the sixteen ships at about 42,000.

On the 10th April the 'Eclipse' again fell in with Seals, and worked amongst them till the 13th, when owing to the distance his crew had to travel upon the ice, and the badness of the weather, the men were completely footsore and exhausted. The result of this second breeding-station was 2416 young and 25 old Harp Seals, and 6 young and 1 old Hooded Seals, making with those previously taken a total of 4596 Seals.

I have mentioned the practice of "binging" Seals, which is precisely the same as that known in the Newfoundland fishery as "panning" or "bulking," a system which ought to be strictly

prohibited; it is quite sufficiently destructive for the sealers to kill all the Seals which they can drag to the ship, but to bulk Seals which from various causes, such as fog, drifting ice, or the vessel being compelled by stress of weather or the tightening of the ice, to desert them, so that possibly they may never see them again, is a wasteful mode of proceeding which ought to be discouraged by all means, and it is to be regretted that by mutual arrangement amongst the sealers or otherwise it is not abandoned.

The result of the Greenland Seal-fishery, so far as the British ships are concerned, was a take of 37,922, or an average of 2917 per vessel, against a total of 22,142 for the season of 1882. Formerly, before the close time was enacted, the sealers took only the skins and oil of the old Seals, the pups being too young to yield oil and their skins useless, they were left to perish; now, however, as will be seen by the result of Capt. Gray's voyage, very few old Seals are killed, and the pups being older and in fine condition, not only is the yield of oil very good, but the skins are equally valuable.

Messrs. Stephen & Son, of Dundee, exhibited at the late Fisheries Exhibition a great variety of fancy leather manufactured from the skins of Seals, and of the pelts of the young Harps dressed with the long soft fur of the first coat, either of the natural colour or dyed; thus prepared they are now extensively used by furriers in the manufacture of the fur capes so universally worn. The consequence of this demand is that the value of the skins has greatly increased, and they bring the importers about 6s. to 7s. per skin. The total value of the 1688 tons of seal-oil brought home by the Scotch vessels from Newfoundland and Greenland last season represents a sum of about £52,328, and that of the 130,276 seal-skins, which may be taken at 6s. each, another £39,082, a very fair average for this portion of the voyage.

I fear, however, there are signs of the Greenland Seal-fishery rapidly approaching the stage in which it will not pay to continue it. It is probable that none of the breeding pack escaped detection this season, and that practically all the young brood was killed off. In 1882 the pack took the ice so far north that some of the vessels missed them altogether, and possibly a portion of the brood escaped, but in the past season the main body of the fleet was up before the close time came to an end, and it is not likely many young ones were left; indeed it is doubtful even now,

were it not for the attraction of the Bottle-nosed Whale fishery, whether our large vessels would be tempted to go north to the Greenland sealing, rather than, as is now done by the Dundee vessels, to Newfoundland, where a much greater chance of success at present awaits them.

The S.S. 'Mazinthien' of Dundee went on the rocks off Peterhead on her outward passage on March 13th and became a total wreck, but happily her crew of fifty men was saved.

The success of the Davis Strait whalers in 1883 was very poor indeed. Six Dundee vessels went to Davis Strait, and one Peterhead vessel to Cumberland Gulf; one of these, the 'Arctic,' fished only for White Whales, of which she captured 1220, the remaining six killed eighteen Whales, some of which were very small, the whole yielding only 208 cwt. of bone; the 'Esquimaux' killed three Whales for 21 tons of oil and 13 cwt. of bone. The 'Thetis,' however, was as successful with the Right Whales as she had been earlier in the season with the Seals, having killed six Whales, which averaged 16 cwt. of bone each, in addition to 791 White Whales. The 'Thetis,' by the fouling of a line, lost her carpenter and boatswain, the boat was carried under, and the remainder of the crew were rescued with difficulty by a boat from the ship.

In all 2736 White Whales were killed; these creatures are captured by placing nets across the entrance to inlets and fjords, up which the Whales go in search of salmon. When the tide retires they are left by the water and easily killed, yielding a ton of oil to every six or seven Whales; their skins, however, are valuable, and when dressed constitute the "porpoise hide" so much prized for its strength and imperviousness to water; the hides are worth about 1s. 6d. per lb.

The probable cause of the want of success in the Davis Straits fishery is the over-fishing, by which the Whales have become unapproachable, and decline to show themselves in anything like open water. How far this is due to the injudicious use of steam on the whaling grounds, and to the keen competition of the whalers, I do not venture an opinion.

Only one Whale was brought home by the Greenland vessels; this was killed by the 'Hope,' Capt. J. Gray, and was a very small fish, yielding only 11 tons of oil and 11 cwt. of bone. Capt. David Gray went north, but finding the ice too fast, instead of waiting

to effect a passage through it to the open coast-water, returned to the Bottle-nosed Whale fishery, which he prosecuted successfully. The total catch of Right Whales by the seven vessels was only nineteen, the quantity of bone being 219 cwt.; a most unsuccessful season, but so great is the present scarcity of bone, which is now selling at upwards of £2000 per ton, that the temptation to try again next season will be very great.

The Bottle-nosed Whale fishery has been vigorously prosecuted, no less than 535 of these creatures having been killed, compared with 413 in the season of 1882; the 'Eclipse' headed the list with 157 fish. Capt. Gray tells me he finds a great difference in the behaviour of these animals since they have been hunted with such vigour; they are becoming much more suspicious and difficult of approach than formerly, and whereas when he first commenced to take them the whole of the school would congregate around a wounded animal, rendering it easy to secure eight or ten out of a herd, now on one being harpooned its companions disappear at once, seeking safety in flight. I am informed that two new vessels have been added to the Peterhead fleet, and that several additional steamers will sail next season from Dundee; in addition to which quite a fleet of Norwegians will take part in the Bottle-nosed Whale fishery. It is not hazardous, therefore, to predict that the decline of this profitable industry will be as rapid as its rise, and that should the present race to get rich at their expense continue, the Hyperoodons will soon be as rare as the Right Whales.

THREE UNPUBLISHED PAPERS ON ORNITHOLOGY.

BY THE LATE EDWARD BLYTH.

No. 3.—Fam. CYPSELIDÆ (Swifts).

A remarkable group of birds, organized, both internally and externally, to produce the maximum power of flight. They have been much confounded with the *Hirundinidæ* or Swallows, which exhibit the true *Passerine* structure to its minutest detail, and which owe their volar power mainly to the development of the wings and tail. The Swifts, in their general conformation, most nearly resemble the *Trochilidæ* or American Humming Birds;

but are solely insectivorous, whereas the *Trochilidæ* subsisting partly on the nectar of flowers (though still chiefly insectivorous, and pursuing minute insects on the wing as well as picking them from flowers), have the bill and tongue modified accordingly.* Externally, they are readily distinguishable from the Swallows by having ten tail-feathers only (like the *Trochilidæ*, and also the *Caprimulgidæ*): the wings are longer, narrower, and distinctly curved, with very robust stems to the outer primaries, the second of which equals or exceeds the first in length;† the character of the plumage is different, and each clothing feather (as in the two preceding families) is furnished with a distinct supplementary plumelet; the conformation generally is much more robust; and the bill is quite of a different form, more approximating that of *Caprimulgus*: the feet (excepting in *Macropteryx*, and perhaps *Atticora*?) differ remarkably from those of every other bird known, in the circumstance of the four toes consisting each of a single phalanx, additional to the ungual phalanx which is armed with a very strong, compressed, and acutely pointed claw; the representative of the hind toe is directed inward (as in *Caprimulgus*), but with rotation of the joint forward in *Cypselus* (whence this genus has been commonly described to have all four toes directed forwards), and backward in *Acanthylis* and *Collocalia*, wherein the hind toe can be well opposed to the other toes. In *Macropteryx*, however, the number of joints of the toes successively increases as in other birds,‡ and the hind toe is fixedly opposed to the others. With a wide gape (as in *Caprimulgus*), the cleft extending to beneath the middle of the eye, and always quite smooth or devoid of *vibrissæ*, the bill is minute, and compressed anteriorly to the nostrils, having the upper mandible incurved and the tomæ of both inflected; the nareal orifices are exposed and vertical, forming oblique, oblong-oval slits. The

* The *Trochilidæ* further differ from the *Cypselidæ* in having complex vocal muscles; though it appears that even in this respect the *Patagona gigas* accords with the Swifts. These two families further differ remarkably in their mode of flight.

† In the more powerful species the first and second primaries are subequal; in the weaker the first is shorter. The stems of the outer primaries attain their maximum strength throughout the class in certain *Trochilidæ*, known as the Sabre-wings (*Campylopterus*).

‡ We have seen a slight exception in *Caprimulgus*.

tongue is narrow, somewhat elongated, a little fleshy, and cleft at tip. The muscular coat of the stomach is tolerably developed, though without constituting a true gizzard; the intestinal canal short and wide (not exceeding the length of the body from bill to vent), and without cæca. The sternum is somewhat narrow, widening posteriorly, with an entire hinder margin, and the keel enormously developed and continued forward (less prominently in *Collocalia*) to terminate in an obtuse point; in the young of all, and in the weaker species permanently, the ossification of the sternum is, however, incomplete about the middle—on either side of the ridge, and also in the thin portion of the ridge or keel itself; the coracoids are short; the furcula also short and widely arched, with a small mesial appendage projecting downward; the humeri are singularly short, with their tuberosities prominent in the extreme degree; the radius and ulna are about twice the length of the humerus; and the remaining (or wrist and hand) bones of the wing together exceed in length the humerus added to the radius. The legs (more especially in *Cypselus*) are very muscular, with the tarsi short, and the grasp of the toes with their sharp claws firm and clutching. The eye is tolerably large, and has its sclerotica strengthened by a circlet of about fourteen ossicles. In size the birds of this family vary from the bulk of a Thrush down to that of the generality of the larger Humming-birds; which latter, indeed, the *Collocaliæ* (or edible-nest-producers) not a little resemble in general aspect, excepting of course that of the bill, and in the lack of the resplendent gem-like colours which adorn the *Trochilidæ* generally, but which are wanting in the largest species of that family (*Patagona gigas*).

Unlike the *Caprimulgidæ*, or at least the genus *Caprimulgus* and its immediate affines, the species of which descend much to the ground, the *Cypselidæ* never do so; and if by accident they fall, some at least of them are unable to rise from a plane surface, but must creep or clamber till they get the elevation necessary to permit of the free action of their long wings.* They are among the most aerial of birds, even copulating on the wing; out early and late, and throughout the day; and all the species would

* The Indian *Cypselus affinis* rises on the wing with perfect facility from the smoothest surface; and we once brought down a British Swift (*C. apus*) which lay on the ground till our near approach, when it rose and flew off as if unhurt.

appear to roost and build gregariously, in dark cavernous recesses of rocks, buildings, or the hollows of trees—some few in the fronds of palms; the nest is either formed of light substances collected during flight, and more or less cemented together by a viscid secretion of the œsophageal glands, or it is even wholly composed of this substance, constituting then the “edible birds’ nests” so highly prized by the Chinese and Japanese. They are extremely tenacious of their breeding-places, and, if undisturbed, resort to the same nests season after season; if the nest be removed, another is immediately constructed in the same place, and this several times successively. Occasionally a number of nests in contiguity are agglutinated to one another; and often they are shaped like a cup vertically divided, the perpendicular surface to which they are attached rendering a deposit of material unnecessary on that side. The eggs are from two to four in number, of a lengthened shape, and (as in the *Trochilidæ* pure white in every known instance.* In general the *Cypselidæ* are highly gregarious, often flying in companies, which are particularly active and noisy when the air is highly charged with electricity; and they generally seek their insect-prey high in fine weather, and near the ground when the weather is damp and gloomy, and towards the dusk of evening—conveying pellets of it to their young, accumulated and held beneath the tongue as in a pouch. Their voice is simple screaming or twittering, according to the species; and the young of *Cypselus apus* has been remarked to emit a singular continuous sound, “like the humming of a tea-kettle.” The flight of all is most vigorous and powerful, smooth and sailing in some species, more or less rapid and impetuous, or in others flickering and irregular, yet with such power of wing it is remarkable that the geographical range of the species is not particularly extensive, but in general rather the reverse. Examples of this family occur in most countries, except the coldest; and at all elevations from the plains to the mountains; where the winter is cold they migrate. In Britain it is remarkable that the Common Swift (*Cypselus apus*) and Nightjar (*Caprimulgus europæus*) are the latest of all the summer visitants to arrive, and

* I suspect that the eggs described by Capt. Tickell in J. A. S. xvii. 302, are erroneously ascribed by him to the Palm Swift, even if found in the nest of that bird. Capt. Tickell, however, remarks that the nest was not brought to him.

the earliest, excepting the adult Cuckoo (*Cuculus canorus*) to take their departure.*

Subfam. CYPSELINÆ.

Distinguished by the very peculiar structure of the digits, each of which consists of but a single phalanx additional to the ungual phalanx, as is the case with the hind toe only of other birds. The majority of the foregoing generalizations refer more especially (so far as yet known) to the present subfamily, and particularly to the genus *Cypselus*. The species present no sexual diversity of plumage, which is commonly sooty-black or brown, with faint-coloured glosses, often relieved with white on the throat, belly, and in several forming a band above the tail.

- A. With more robust feet, the representative of the hind toe rotating forwards, and not completely opposable to the other toes.

Genus CYPSELUS, Illiger (Ordinary Swifts).

These have a square or generally a forked tail, with no tendency to be spinous; the toes are short, and the tarsi are always feathered above. About eighteen species are known, some of which occur in most parts of the world; two visiting Europe in summer, but none N. America; one only has been observed in Australia.

C. MELBA; *Hirundo melba*, L.; *H. alpina*, Scopoli; *H. gularis*, Stephens; *C. alpinus*, Tem.; *C. gutturalis*, Vieillot.—Length about $8\frac{1}{2}$ in.; of middle tail-feathers $2\frac{1}{2}$ in., the outermost $\frac{3}{4}$ or $\frac{7}{8}$ in. longer; wing from bend 9 in. General colour brown, with white throat and belly; a reddish-purple gloss on the back.

Inhabits the Nilgiris, and Central India: also Africa; and chiefly the high mountains of S. Europe, visiting rarely the British Islands. Mr. Jerdon "first observed it on the road between Madura and Pallamcottah, when an innumerable flock passed over camp from the range of eastern ghats, travelling towards the east coast. It was almost midday in the month of

* Very rare individual exceptions have been known to occur, but, from special causes, as a late brood of young; yet it is stated that they will sometimes leave a brood of unfledged young to perish, so strong is the migrative impulse.

August. They kept a steady easterly direction. I afterwards," he continues, "saw at Travancore single birds flying about at an immense height with great rapidity. I saw them also on the top of the Nilgiris, towards the edges of the hills; and at Madura, flying in small parties every evening, just before sunset, towards the east coast, apparently from the hills in the neighbourhood, as I did not see them during the daytime. Their flight is amazingly rapid."

C. VITTATUS, Jardine & Selby, Ill. Orn., 2nd series, pl. 39.—Size and form of the common British Swift (*C. apus*, which species, it may be remarked, is a common summer visitant in Afghanistan); but distinguished from it by its blacker colouring, narrow white band above the tail, widening on each side, and by the duller albescent hue of the throat gradually diminishing much further down, the extreme tips of all the feathers of the lower parts being commonly albescent. Wing 7 in.; span of foot $\frac{7}{8}$ in. This bird varies, however, somewhat in size. Its claws are of a dusky-brown colour.

It is common about Penang, and extends its range eastward to China. From the Australian *C. pacificus* (Latham), v. *australis*, Gould, it seems to differ little; but, according to Mr. Gould's figure, the latter has the wide throat pure and well defined, and a broader white band on the rump.

C. LEUCONYX, Blyth, J. A. S. xii. 212.—Very similar to the last, but smaller, with a much smaller foot and white claws. Tail forked to the depth of $\frac{5}{8}$ in., its outermost feather $2\frac{1}{2}$ in.; wing 6 to $6\frac{1}{4}$ in.; span of foot $\frac{5}{8}$ in.

A rare species, but extensively diffused over India proper. Mr. Jerdon procured it in the Deccan, and has also obtained it from Malabar. An individual flew into an open room within a few miles of Calcutta, which is the only specimen we have seen from Bengal. In its flight it would be conspicuously distinguished from the next by its distinctly forked tail and much longer wings; but though many times looked for, we have never seen it in the air. Perhaps it ordinarily flies very high, in which case the time to seek for it would be in gloomy weather, or towards evening, when all the tribe hawk nearer the ground.

C. AFFINIS, Gray, Hardw. Ill. Ind. Zool.; *C. nipalensis*, Hodgson, J. A. S. v. 780; *C. montanus*, Jerdon, Madr. Journ. xiii. 144; probably *Hirundo fancica*, Gm., apud Griffith's

'Animal Kingdom,' vii. 67 (nec *H. fancica* vera). *Abadil*, Hind.—Remarkable for its shortish, even tail, the feathers of which are not pointed (as in the various preceding species). Length $5\frac{3}{4}$ in., by 12 in.; wing 5 in.; tail $1\frac{3}{4}$ in. Colour brown-black, blackest on the back; with a white throat and rump; head brownish, palest on forehead. Irides deep brown.

The common urban and village Swift of India generally, resident throughout the year; and though not generally a mountain bird, the *C. montanus*, Jerdon, inhabiting cliffs in the Nilgiris, appears to us to be perfectly identical; and Mr. Jerdon remarks of *C. affinis* that on the west coast he saw it "upon several occasions, chiefly among rocky hills, but only observed it twice or thrice throughout the whole length of the table-land from the Tapoor Pass to Jaulnah, and then but few in number. At this latter place, however, it is very common." In the Deccan it is so rare that Col. Sykes obtained only two specimens. Yet, observes Mr. Jerdon, "it is found in all districts of India, but in these is often confined to a small tract in the neighbourhood of some few large pagodas, large old choultries, and other similar buildings. In the Carnatic it is common in Madras, at the rocky foot of Trichinopoly, and very numerous at the large pagodas at Madura, among which their nests are thickly crowded. It seldom, I think, takes a very long range from its breeding-place. During the night they roost in their nests, four or five often occupying the same one, as I observed in the celebrated choultry at Ajunta. It builds its nest in company always, often thickly crowded together, placing them in corners or crevices of old buildings." In Bengal they are often placed in a low porch or verandah, even in the most crowded thoroughfares of towns, the birds passing to and fro, twittering loudly, and regardless of the throng beneath. Capt. Tickell correctly describes the nests as "large, flat, irregular, of fine straw, hay, and feathers, closely interwoven and kept together with the glutinous substance supplied from the bird's salivary [proventricular] glands, generally glued against some beam in a verandah or outhouse. Eggs three, of a lengthened shape, spotless white. July." Mr. Hodgson terms this "the common Swift of the central region of Nepal, building under thatched roofs, and against the beams of flat roofs." It very commonly enters rooms through open windows, and flying to and fro near the ceiling finds much difficulty in escaping by the

way it entered. A slight touch with a switch brings it down immediately, when it suffers itself to be handled without making an effort to escape; yet place it on the smoothest table, and it rises with the utmost facility, springing high enough to gain the action of its wings. Let the wings be tied, and it will then be seen to be incapable of progressing by the feet on such a surface, while it endeavours to relieve itself by repeated springs. The flight of this species is very unlike that of the British Swift, being less steady, and performed with much action of the wings, with intervals of sailing, though never smoothly along for any distance. The voice is a sort of shivering scream, rather than a twitter.

We have never seen this bird from the eastern side of the Bay of Bengal; but Mr. Strickland notes it from Malacca—"Rather larger and of a deeper black than Indian specimens, but I do not," he adds, "venture to separate them. Wing $5\frac{1}{4}$ in.; tail $2\frac{1}{8}$ in." (P. Z. S. 1848, p. 99).

C. BALASIENSIS, Gray, Griffith's An. Kingd. vii. 60; *C. palmarum*, Gray, Hardw. Ill. Ind. Zool.*—A small species, with rather deeply forked tail, and with the first primary considerably shorter than the second, and attenuating to the tip. Length to end of middle tail-feathers $3\frac{1}{2}$ in., the outermost $1\frac{1}{4}$ in. more; alar expanse $10\frac{3}{4}$ in.; wing from bend $4\frac{1}{2}$ in. Colour wholly of an ash-brown, paler (somewhat albescent) below; wings and tail darker, and faintly green-glossed. Irides dark brown.

"This little species," remarks Mr. Jerdon, "is common to all the districts of India, except on the bare table-land, where it is very rare. It frequents groves of palms, especially the *Borassus flabelliformis*, and does not in general fly to any distance from them. It is very abundant in the Carnatic." In Bengal it is also common, but a rural and garden species, which does not come much over towns, being generally found wherever a tall or isolated

* Châmchiki is the only native name which we have heard for this species, and for *Hirundo sinensis*; but it properly refers to the Bats (exclusive of *Pteropus*), and is doubtless applied to these birds from their somewhat Bat-like mode of flight, unsteady and flickering. However, a remarkable Bat-like analogy is observable in most *Cypselidæ*, in the roosting places which they resort to, whether in buildings, or the deep rock-caverns of the *Collocaliæ*, or the instance of many thousands of *Acanthylis pelasgia* retiring into a single hollow trunk. As for their time of activity, the Swifts begin to retire to roost when the Bats begin to come forth after sunset.

Borassus grows; about a dozen pairs commonly resorting to the same tree, and attaching their nests to the upper surface of the drooping fan-like fronds, protected by overhanging fronds above. Affixed by the glutinous secretion to a plait of the frond, the rest of the nest does not (as in other Swifts) appear to be cemented by this substance, but is a closely-felted mass of silk-cotton (the pappus of the *Bombax heptaphyllum*), forming a neat cup of considerable strength, and lined with feathers. Except in size and mode of attachment, it is indeed remarkably like the nests of the generality of *Trochilidæ*.^{*} The eggs I have not seen. The palm selected for their abode is conspicuously indicated by the birds perpetually keeping about it, and ever and anon one or more of them entering or leaving the recesses of its dense head of foliage, sharply twittering as they fly, in their rapid, irregular, and vacillating course, sustained by much action of the wings. Not unfrequently the same palm is tenanted by a busy assemblage of Bayas (*Ploceus*), with their pendant retort-like nests waving in the breeze.

Mr. Gosse has lately described a species of very similar habits in Jamaica, which he makes a genus of, and designates *Tachornis phanicebia*. The chief difference from *Cypselus* seems to be that the ossification of the sternum and its ridge continues permanently incomplete (as in the *Collocaliæ*), denoting a general weaker structure. In the Indian Palm Swift such is not the case. The latter species does not appear to have been observed by Mr. Hodgson in Nepal, but to the eastward we have seen it from Arracan (Ramree).

^{*} Indeed the Humming-birds *affix* their nests to a single twig, vertical or horizontal, according to the species; and Mr. Gosse, in his description of the nest of *Trochilus polytmus*, notices "some viscous substance, probably saliva, evidently applied after the web was placed," alluding to a covering of spiders' webs "crossed and recrossed in every direction" over the outside of the fabric. Hence it seems not improbable that species of *Trochilidæ* may yet be discovered to attach the nest to a flat surface, like the *Cypselidæ*, if indeed they do not all use the same glutinous secretion to make the first rudiments of it adhere. These diminutive birds sleep roosting, as do probably the *Macropteryx* genus of the *Cypselidæ*, and do not put the head beneath the wing, like most other birds. Neither probably do the *Cypselidæ*, as also the *Trogonidæ* and *Caprimulgidæ*. The lengthened white eggs of the *Cypselidæ* and *Trochilidæ* present a further similarity between the two families.

B. With less robust feet, the representative of the hind toe rotating backwards, and opposable to the other toes.

Genus ACANTHYLLIS, Boie. (Spiny-tailed Swifts).

Distinguished by robust general conformation (as in *Cypselus*), and by having an even or wedge-shaped tail, with the shafts of the feathers prolonged into rigid spines, more or less developed. The tarsi are covered with a naked skin, and with the toes are less robust than in *Cypselus*, and comparatively somewhat elongated.* About fifteen species are known, which severally inhabit S.E. Asia and its islands, Australia, Africa, and both Americas.† Two only, of small size, visit N. America, one on either side of the great mountain range; and that of the Atlantic States has been the most studied of the genus. This bird is known as the

* In Mr. Gosse's 'Birds, of Jamaica,' an extract from the MS. notes of Dr. Anthony Robinson (vide the work cited, p. 20) is given in the notice of a rather large species, supposed to be *A. collaris* (Pr. Max.), in which it is stated—"As this bird seldom alights, it is furnished with two supernumerary bones, which are placed on the superior and exterior part of the leg [tarsus?]; the skin that covers them is of an obscure flesh-colour; they are of an oblong ovated form, $\frac{1}{4}$ in. long; and as the bird hangs upon a wall, rock, &c., by its claws, these bones are pressed close to it, and the leg thereby secured from harm." The two large Indian species have no trace of such a structure. Of the same species another observer remarks—"The legs are curiously constructed: the tarsus cannot extend further than at an angle of 28° , nor can it be straightened; so that it corresponds with the tail-feathers, and keeps the bird in an upright position against vertical rocks and trees. From this formation the bird cannot stand erect on the ground, nor can it apparently walk"; and the same observer was told by fishermen and others that they have taken young ones *clinging* to the vertical honeycomb rocks, against whose base the sea dashes. Dr. Robinson, however, remarked of a living specimen that on the floor "it crept along with its legs bent, leaning on the aforesaid bones, but was not able to raise itself upon its feet. When by any accident this bird falls to the ground, as sometimes happens, it creeps or scrambles to some rock or shrub, when, bending the tail and expanding its wings, it elevates its body, and at the same time throwing its legs forward catches hold of the rock, &c., with its claws, and climbing up to a proper height throws itself back and recovers its wings." This species has been traced to caverns in the mountains of Jamaica, in which they appear to nestle by hundreds. In *Cypselus* and *Collocalia* it may be remarked that the action of both the tibial and tarsal joints is particularly free.

† A single individual of the Himalayan species has been killed in England, at or near Colchester, in Essex, as I am informed by Mr. Bartlett. [A second has since been procured, cf. Zool. 1880, p. 81.—ED.]

Chimney Swallow in the United States, from its constant habit of resorting to chimneys wherever it can, while in the depths of the forest it roosts and nestles in hollow trunks of trees, and sometimes in caverns. M. Audubon relates that he counted nine thousand of them roosting in the hollow trunk of a plane tree (*Platanus occidentalis*) in Kentucky. It migrates in multitudinous hosts, circling in their flight at a great altitude. All observers agree respecting the extreme rapidity of wing of the birds of this genus, and the elevation at which they soar in fine weather. Of the great Australian species (which would appear to be identical with that of the Himalaya), Mr. Gould writes—"I have frequently observed in the middle of the hottest days, while lying prostrate on the ground with my eyes directed upwards, the cloudless sky peopled at an immense elevation by hundreds of these birds, performing immense curves and sweeping flights; hence few birds are more difficult to obtain, particularly on the continent of Australia, where long droughts are so prevalent; on the contrary, the flocks that visit the more humid climate of Van Dieman's Land, where they necessarily seek their food near the earth, are often greatly diminished by the gun during their stay." The nidification of none of the three species has been observed.

The first two of them are very large.

A. CAUDACUTA; *Hirundo caudacuta*, Latham; * *Cypselus giganteus*, Tem.; Spiny-tailed Swift, Jerdon, Madr. Journ. xiii. 173.—Length about 9 in.; of wing from flexure 8 in.; tail $2\frac{1}{2}$ in.; its form cuneated, but the barbed portion of the rectrices subequal, their prolonged stems much lengthened and very robust, those of the middle rectrices protruding $\frac{1}{2}$ in. Crown and nape, wings, tail and its upper coverts, and the sides of the rump, glossy black, with steel-blue and green reflections; the last further bordered with white posterior to the thigh, and the inner web of the smallest tertiaries is whitish; under tail-coverts also white; back, scapularies, and medial portion of the rump, hair-brown; paler towards the middle of the back; lower parts dusky-brown, paler towards the chin; a white spot before the lores in some specimens only. Female (?) rather smaller, with the colours less distinctly contrasted; wing 7 in. "Irides deep brown" (Jerdon).

This bird inhabits (or visits ?) the Nilgiris, Ceylon, the

* "Throat very pale dusky." Latham.

Malayan peninsula (especially about Penang), and has been obtained so high as at Sandoway, in Arracan, where deemed a rarity. Mr. Jerdon observed it "in vast numbers at the foot of the Nilgiris, both at Metapollium and Goodaloor. It flies with amazing velocity."

A. FUSCA (?); *Hirundo fusca* (?), Shaw; *Chætura australis* (?), Stephens; *C. macroptera* (?), Swainson, Zool. Ill., 2nd series, pl. 42; *C. nudipes*, Hodgson, J. A. S. v. 779; *Cypselus leuconotus*, Mag. de Zool. 1840, Ois. pl. 20, and figured also in the Souvenirs, &c., of M. Adolphe Delessert, pt. ii. pl. 20, p. 25.—Similar to *A. caudacuta*, but having the whole chin and throat pure white, and the spinous tips to the rectrices much less developed, the medial scarcely protruding $\frac{1}{4}$ in. In *A. caudacuta* also the barbed portion of the rectrices narrows off to its termination, as in most Woodpeckers; whereas in *A. fusca* (?) the barbed portion rounds off at tip, so that the spinous ends of the stems protrude abruptly. Mr. Hodgson gives the length of the recent bird as "8 $\frac{1}{2}$ in., and alar expanse 20 in. Weight 4 $\frac{1}{2}$ oz. Irides dark brown. Sexes alike. The young," he adds, "want the blue or green gloss of maturity; the clear whity-brown of the back and pure sooty-brown of the belly are in them blended into an uniform dusky hue; and their throat is of a very sordid white."

Hab. Nepal, Sikim, and Bootan; and, to judge from the figures published by Mr. Swainson and Mr. Gould, it would appear to be perfectly identical in Australia. Mr. G. R. Gray, however, in his illustrated 'Genera of Birds,' enumerates the Himalayan and Australian species as distinct. In Nepal Mr. Hodgson states that—"Its habitat is the northern region, whence it sometimes wanders into the mountains of the central, avoiding, however, the open and plain country. It climbs with great power, aided equally by its talons and its tail."

In an obliging communication from Captain Tickell, received just in time for insertion here, this naturalist remarks:—"After much patience I shot one of these birds at Darjeeling, where they first appear in September. In the plains I have not seen them; and it is probable that they pass from the Himalayas to the high ghâts of Central India without halting intermediately. It is in September that the snow, gathering on the higher Himmalas, drives down hordes of birds to lower ranges, and amongst them immense flocks of *Hirundines*" (i. e., *Hirundinidæ* and *Cypselidæ*).

"Of these I have watched scattered bodies passing over Darjeeling for many days together, journeying to the S. and S.W. They consist chiefly of *Callocalia unicolor* (*nidifica*), *Acanthyllis Sabini*?, *Hirundo riparia*, and doubtless all the other species that visit us during the cold season. Amongst these *Acanthyllis nudipes* is at once recognised by his great size and the prodigious swiftness of his movements. There is nothing I have ever witnessed equal to the flight of this bird; it is something bold and vast, and in keeping with the sublime precipices and cloud-capped pinnacles, which are its favourite resort. It breeds among the huge wall-like crags of the Himmala, and under the snow level."

In the same communication Capt. Tickell writes, of *Cypselus melba*:—"This is a common bird in the high central parts of India, from Mednipoor westward, in the cold weather. It mingles indiscriminately with flocks of *Hirundo europyga* (i. e., *daurica*, v. *erythropgia*), *H. rustica* (*gutturalis*?), *Cypselus affinis*, and other common species, but flies so high as often to escape observation. It resorts much to the tops of high rocks or wooded hills, the summits of which it flies round with great velocity. I have shot them both in jungly and in open country. In Colgong, in Mantbhúm, and in Chota Nagpore, flocks sometimes assemble of an evening near large ponds in the jungles, dashing into the water with loud screams, like our Swifts (*C. apus*) at home."

In Europe, remarks Mr. Yarrell of *C. melba*, "High rocks and the loftiest parts of cathedrals and church spires are the places chosen by this bird, in the fissures of which it forms a nest of straw and moss" (?), "and these are cemented by a glutinous matter, which, when dry, makes the nest very hard.* M. Vieillot says the nest is small for the size of the bird, and, when fixed against a vertical surface, is in the form of a half-circle. This bird lays four or five elongated white eggs. The *Cypselus africanus*, or *le Martinet à gorge blanche* of Levaillant's 'Birds of Africa,' is considered to be the same as this White-bellied Swift."

While adding the above, and too late for insertion in its proper place, we have been fortunate in procuring a nest, evidently just built (August), of *C. balasiensis*, containing a broken

* This description applies equally to nests of *C. apus* which we have examined, some of which more especially were solidified into a very firm crust or shell.

pure white egg. Unlike those built in the cold season of the pappus of the *Bombax*, this is composed almost wholly of feathers, with a little admixture of pappus or vegetable down of some other very different plant, and most firmly agglutinated to the under surface of a *Borassus* frond by what assuredly looks like glistening and inspissated saliva. The structure, as in the nest before described, is remarkably firm and compact.

A. SYLVATICA, Tickell, J. A. S. xv. 284.* — Much smaller than the two preceding species, having the wing but $4\frac{1}{2}$ in.; the entire length from tip of bill to end of tail, $4\frac{1}{3}$ in. Details of structure as in the last species; the wiry tips to the shafts of the rectrices well developed. Colour: above blue-glossed black, with a white rump; belly pure white, the feathers dark-shafted; rest of the under parts iron-grey, with a dash of ashy brown. Bill, iris, and legs brown.

Hab. Central India; and also the S.E. Himalaya. According to Capt. Tickell this species, as observed in Central India, "haunts open cultivated grounds in the midst of forest; also the cleared patches on the sides and summits of the hills. It is common, but local; gregarious and noisy; being often seen in company with *Cypselus melba*." (*Non vidi*).

Genus COLLOCALIA, G. R. Gray (Swiftlets).

These are true *Cypseli* in structure, but comparatively feeble, having the first quill shorter than the second, and the wings and tail broad, the tail especially much resembling that of a Humming-bird, with its feathers of even length or nearly so. The feet and naked tarsi resemble those of *Acanthyllis*, having the hind-toe well opposed; but are comparatively slender, though of proportionate strength to the rest of the conformation. The breast-bone and its ridge remain incompletely ossified. Not more than three species appear to be known, though perhaps others require discrimination; they are of small or minute size, and are confined in their geographic distribution to the Indian, Indo-Chinese, and

* Capt. Tickell suggests the identity of this species with *Chætura Sabini*, Gray, described in Griffith's edition of the 'Animal Kingdom,' vii. 70, as "Bluish black, belly and rump white; Africa." And with this Mr. G. R. Gray identifies *Chætura bicolor*, Gray, Zool. Misc., p. 7, which description we have not seen.

Austral-Asian countries, as far as N. Guinea. Certain (if not all) of them produce the valued "edible nests" of commerce.

"In Java," remarks Sir Stamford Raffles, "these birds not only abound amongst the cliffs and caverns of the south coast of the island, but inhabit the fissures and caverns of several of the mountains and hills in the interior of the country. From every observation which has been made in Java it has been inferred that the mucilaginous substance of which the nests are formed is not, as has been generally supposed, obtained from the ocean. The birds, it is true, generally inhabit the caverns in the vicinity of the sea, as agreeing best with their habits, and affording them the most convenient resorts for attaching their nests to; but several caverns are found inland, at a distance of forty or fifty miles from the sea, containing nests similar to those on the shore.* From many of their retreats along the southern coast they have been observed to take their flight in an inland direction, towards the pools, lakes, and extensive marshes, covered with stagnant water, as affording them abundance of their food, which consists of flies, musquitoes, gnats, and small insects of every description. The sea that washes the foot of the cliffs, where they most abound, is almost always in a state of the most violent agitation, and affords none of those substances which have been supposed to constitute the food of the 'Esculent Swallow.' Another species of Swallow [Swift?] on this island forms a nest, in which grass or moss, &c., are merely agglutinated by a substance exactly similar to that of which exclusively the edible nests consist. This substance, from whatever part of these regions the nests be derived, is essentially

* See also Hooyman, in the 'Batavian Transactions,' iii. 95; likewise Marsden; and Sir G. Staunton, in his narrative of the Earl of Macartney's Embassy to China; while Mr. G. R. Gray relates (rather as if a novelty), on the authority of Mr. Hugh Cuming, that in the Philippines the nests are found inland to the distance of fifty or sixty miles. One species has, in India, been only observed hitherto in the mountains of the interior, at a distance of many hundred miles from the sea. According to Mynheer Hooyman, however, the nests (even of the same species) vary somewhat in quality in different neighbourhoods. Thus, of those obtained in two inland localities, not very far apart, and but a few hours' journey distant from Batavia, he states that the produce of one of these places is at least a third less valuable than that of the other, which latter is in its turn reckoned very inferior in quality to the nests gathered at Ternate and other islands chiefly to the eastward of Borneo. These last, however, we suspect, are not the produce of the same species.

uniform, differing only in the colour, according to the relative age of the nests. It exhibits none of those diversities which might be expected if it were collected casually (like the mud employed by *Hirundo urbica*, and the materials commonly employed in nest-making), and applied to the rocks. If it consisted of the substances usually supposed it would be putrescent and diversified."

"Dr. Horsfield," continues Sir S. Raffles, "thinks that it is an animal elaboration, perhaps a kind of secretion;"* and Sir Everard Home, after examining the stomach of one of these birds, pronounced his decided opinion that the edible nests are composed of a substance secreted by the glands of that organ.† M. Poivre, who in his often-quoted communication to Montbeillard (Buffon's Hist. Nat. Ois. vi. 688, *et seq.*), advocated the exploded notion that the substance was collected from the sea, remarks that there have been seen threads of this viscous matter hanging from the bills of these birds; and that it is believed, though without any foundation, they were derived from the stomach during the nesting season. M. Hooyman long ago (1781) was of opinion that the substance of them was nothing to do with sea-foam, but is elaborated from the food of the bird.‡ The Rev. J. Barbe adds, to his account of the nests gathered in the Nicobars, &c., quoted in the sequel, that "The Chinese say that when the nest is taken before it is completed the bird makes another, but of an inferior quality; and it appears that it exhausts itself in building the second, the nest being spotted with blood."§ The prevalent opinion is that the substance is secreted by the salivary glands; but though, on carefully dissecting a specimen of *C. fuciphaga*, killed when there is reason to suppose that it had young (and therefore too late in the season), no remarkable development either of the salivary or of the proventricular glands was apparent, yet we are fully convinced that it is secreted by the latter, from examination of other *Cypselidæ*; even in *Cypselus balasiensis*, which employs so little mucus, which is laid on merely to make its nest adhere, we have detected *in situ* stringy clots of it, while the proventricular glands were

* 'History of Java,' i. 51.

† Home, as cited in Griffith's 'Animal Kingdom,' vii. 98.

‡ 'Bataviaasch Genootschap,' iii. 97.

§ J. A. S. xv. 363.

adequately developed for its production. The animal origin of the edible nests is at once detected by simply burning a bit of one; and Mr. Laidlay informed us that, upon analysis, he found the constituent elements to be those of inspissated saliva.* Looking to a number of them, and more particularly to their under surface, the quantity laid on by the bird at each time, in successive layers to the rim, is in many conspicuously apparent, and this quantity is much more than the salivary glands could well be supposed to elaborate. Each addition consists of a linear collop continued along the whole semicircular rim of the nest, which latter forms generally a shallow saucer, imperfect where affixed to the rock, and when completed having the place of attachment on either side much thickened. It is evidently in a very viscid state when laid on, adhesive at first, ductile and tenacious while drying, so that on the upper surface threads of it are pulled forth by the bird, and more or less crossed into a kind of network, as if to bind together the vertical layers, some of which are often partially unadherent. These threads, however, consist of a little additional matter to that originally laid on in the successive marginal deposits. Mr. G. R. Gray writes:—"The formation of the nest differs with the species. Some appear to be formed of flakes or threads cemented together, making an almost solid nest; others are composed entirely of viscous matter. The exterior exhibits many nearly straight threads, which incline or are attached to each other, strengthened in front by some few short pieces of slender sticks" (this we have never seen). "The interior, which is rather shallow, shows many layers of irregular network, formed of a multitude of threads that cross and recross each other in every direction."

When newly formed these nests are perfectly clean, of a yellowish white colour, and wholly soluble in water; but when old they become deeply soiled and mixed with feathers, and their value is immensely deteriorated. Hence, as Marsden remarks, "they are distinguished into white and black, of which the first are by far the more scarce and valuable, being found in the proportion of one only to twenty-five. The white sort sells in China

* J. A. S. xiv. 543. "Upon this supposition, however," Mr. Laidlay has since added, "I do not see how it could be deposited in the form of layers, as it is. The mechanical structure of the nest may be very nicely exposed by soaking it for a few hours in rain-water."

at the rate of 1000 to 1500 dollars the picul* (according to the Batav. Trans. for nearly its weight in silver); the black is usually disposed of at Batavia at about twenty or thirty dollars for the same weight, where, I understand, it is converted chiefly into glue. When the natives prepare to take the nests they enter the caves with torches, and forming ladders of bamboos, notched according to the usual mode, they ascend and pull down the nests, which adhere in numbers together from the sides and top of the rock. I was informed that the more regularly the cave is thus stripped the greater proportion of white nests they were sure to find, and that on this experience they often make a practice of beating down and destroying the old nests in larger quantities than they trouble themselves to carry away, in order that they may find white nests the next season in their room." According to M. Hooyman the *C. nidifica* is about two months preparing its nest, and lays two eggs, which are hatched in fifteen or sixteen days; and of a species, which would appear to be *C. fuciphaga*, M. Poivre informs us that each of the nests which he observed contained two or three eggs or young; Sir G. Staunton, of doubtless the same species, asserts that it lays two white eggs.

The nests of the *Callocaliæ* are placed against the sides and roof of deep caverns of chiefly limestone rocks, at distances from the entrance varying from fifty to several hundred feet. Wherever (as we have seen) these caves occur, whether inland or in cliffs overhanging the sea, the birds resort to them alike in prodigious numbers, building commonly in successive layers, many nests together, but always where the cavern is perfectly dry, for obvious reasons. Every fitting site is usually crowded with the nests. The entrance to the cavern may be large, or so small as barely to admit the birds and their Bat-companions; and inland the rocks are sometimes clad externally with dense jungle. At break of day the birds issue forth with a great rush, at which time the Kites (*Ialiastur pondicerianus*?) commit much havoc among them (being therefore destroyed by the Javanese and others); and in fine dry weather they fly very high, like the rest of the

* 133½ lbs. avoirdupois. The current price in China at this time is 18 dollars and upwards per catty of 1 lb. 5½ oz., or $\frac{1}{100}$ picul, i. e., £4 10s. 8d. per lb., reckoning the dollar at 4s. 3d.

group, rising till they are out of sight, and low in rainy weather, returning early in the afternoon direct to their cavern, from which they do not again issue till the following morning. Most of these details are gathered from M. Hooyman's paper on *C. nidifica*.

The Rev. J. Barbe remarks, of the nests of *C. fuciphaga*, gathered at the Nicobars, at Mergui, &c., that "They are of six qualities: the first, of a fine whitish colour, is obtained by taking the nest before the Swift has laid its eggs. This quality is sold at Penang from forty to fifty dollars the katee (!) The second quality, of a brownish colour, is obtained by taking the nest when the bird has laid her eggs. This quality is sold at Penang from twenty to thirty dollars the katee. The third quality is of a dark colour, mixed with blood and feathers, being obtained by taking the nests when the young birds have flown; the price of this is very low." The gradual exhaustion of the bird, according to Mr. Barbe's information, has been already cited. "The manner in which the Chinamen prepare the nest," continues the same gentleman, "is to steep it in water during one night; then with great trouble they clean it. This being done, they boil it in water, to which they have added some sugar-candy, till the whole forms a jelly: one nest prepared in this manner is enough for one person."*

The people who gather the edible nests practise a variety of superstitious ceremonies in relation to them, which belong rather to their history than to that of the birds, and therefore need not be here described. But another point of interest arises respecting the actual species which produce them; and it would seem that all the authorities to whom I have access, who have discriminated different species of these birds, are more or less in error. Firstly, as regards the *Hirundo esculenta* of Linnæus (founded on Brisson's description of one of M. Poivre's inaccurate drawings), there is no reason to suppose that this as described, with yellow

* "Birds' nests being very dear," he further continues, "the wealthy Chinamen only can obtain this delicacy. The rich opium smokers take in the morning a cup of it for the purpose of refreshing and strengthening their debilitated frames. Persons attacked by consumption are advised by the Chinese practitioners to take these nests; they prescribe the same to those who are reduced by a protracted illness; and I have seen several persons, who, having made use of this remedy, declared that they found a temporary relief from this refreshing and nourishing food."—Journ. As. Soc. xv. 363.

irides and white-tipped tail, has any prototype in nature; the latter would be an anomaly throughout the *Cypselidæ*, but may refer perhaps to the white tail-markings of some real *Hirundo*, erroneously supposed to be the constructor of the edible nests.* Dr. Horsfield gives the species termed Lawet by the Javanese as *Hirundo esculenta*, Osbeck, stating that the specimens which he examined in Java, and those which he took to England, differ from Latham's description in being uniformly of a blackish colour, without a white extremity to the rectrices. Another species, the Linchi of the Javanese, he gives as *H. fuciphaga*, Thunberg, stating that "Its nest is constructed of mosses and lichens, connected with the same gelatinous substance which composes the edible nest of the preceding species."† This accords with what has been already cited from Raffles; and in an interesting account of Karang Bolong, on the southern coast of Java, and of the birds' nest rocks there, translated from the 'Tijdschrift voor Neerlands India' in the 'Journal of the Indian Archipelago,' i. 107 (Sept., 1847), the same two species are distinguished by the names Lawet and Lintye, and the nest of the latter is described to be "without the least value. The residence of these Swallows (Swiftlets), termed Lintye in the caves," it is added, "contributes greatly to the injury of the holes, for which reason they are destroyed as much as possible at each gathering. The nests which they make are constructed of grass-stalks; they are, however, of the same form, and are as artfully made as the others."

Mynheer Hooyman likewise states, that besides the Lawet (Waled or Boerong † Daija of the hill Javanese), "other species resort to the same caverns, which are named Momomo, Boerong itam, § Boerong zoekoet, and Lintje. These," he adds, "are very similar to each other, excepting the second, which has the head larger, and the feathers of all are entirely black. The nests which they construct are black and friable, composed of a light

* I find, indeed, that M. Montbeillard describes it to have twelve tail-feathers, which bears out the above idea that it may be a true *Hirundo*, and shows that it cannot be a Swift. It was on the drawings by M. Poivre that the *Cuculus sinensis* and *C. paradiseus*, Linn., were founded, the one representing a Corvidous bird (*Psilorhinus*) and the other a Drengo (*Edolius*), each represented with a reversed outer toe!

† Linn. Tr. xiii. 143.

‡ Burong, i. e., bird.

§ Literally, Black-bird.

down" (agglutinated?). "An opinion prevails that the presence of these birds is injurious to the caverns, on which account they are driven away as much as possible." Another writer in the same volume of the 'Bataviaasch Genootschap' (p. 248), mentions the Momos or Boerong itam (thus bringing together M. Hooyman's first two species), as a larger kind with plumed tarsi, indicating thus a true *Cypselus*, which is probably the constructor of the nests assigned by Dr. Horsfield and others to the Linchi. Assuredly, however, the *C. fuciphaga* (Thunberg), Linchi or Lintye of the Javanese, identical upon comparison with Javanese specimens, would appear to be the sole producer of the numerous nests gathered on the rocky coasts of the Bay of Bengal; and the often-quoted notice by Sir G. Staunton, in his account of the Earl of Macartney's Embassy to China, must refer either to *C. fuciphaga*, or to an entirely new species (which is hardly to be supposed in the locality). For he remarks that "The birds which build these nests are small grey Swallows, with bellies of a dirty white. They were flying about in considerable numbers; but they were so small and their flight so quick that they escaped the shot fired at them."* This was at an islet off the southern extremity of Sumatra, close to where M. Poivre also observed them, who remarks that "leur taille étoit à peu-près celles des Colibris."† The birds may have appeared greyish on the wing, but the white belly is characteristic of *C. fuciphaga*; and this particular species occurs abundantly on parts of the coast of the Malayan Peninsula, in the Nicobar Islands, and Mergui Archipelago, and so high as on certain rocky islets off the southern portion of the coast of Arracan, where the nests are annually gathered and exported to China. From all this range of coasts we have seen no other species than *fuciphaga*; nor does it appear that any other has been observed; and we have examined a multitude both of the adults and of young taken from the nests collected in the Nicobars and preserved in spirit, all of which were of the same species. Nevertheless, what appears to be *C. nidifica* inhabits the mountains far in the interior of India, though hitherto unobserved upon the coasts; and it is worthy of notice that *C. fuciphaga* does not appear to have been hitherto

* Narrative of Macartney's Embassy, i. 287.

† See also Valentyn, as quoted in the 'Bataviaasch Genootschap,' iii. 247.

remarked inland in this country. The species which builds the edible nests collected on the western coast of the Indian Peninsula, as in the group of small islands about eight miles west of Vingorla (which is a little above Goa, and 275 miles from Bombay), commonly known as the Vingorla Rocks, where about 1 cwt. of them are produced annually, remains to be ascertained.

C. NIDIFICA; *Hirundo nidifica*, Latham; *H. fuciphaga*, apud Shaw; *H. esculenta*, apud Horsfield; *H. brevirostris*, McClelland, P. Z. S. 1839, p. 155; *H. unicolor*, Jerdon, Madr. Journ. xi. 238, referred by that naturalist to *Cypselus*, *ibid.*, xiii. 173, and termed *C. concolor*, J. A. S. xi. 886 (there being a previously described *C. unicolor*). Length, $4\frac{1}{2}$ to $4\frac{3}{4}$ in., the middle tail-feathers 2 in., and outermost $\frac{3}{8}$ in. longer; wing, $4\frac{1}{2}$ in. General colour fuscous-brown, darker on the crown, wings and tail, which latter have a dull gloss of steel-blue or green; below paler. From M. Hooyman's description of this species we feel satisfied of the identity of the Indian and Javanese birds, which some of the translated accounts had rendered doubtful.

This species, in India first observed in Assam, appears to be a regular bird of passage at Darjeeling, where Capt. Tickell observed flights of them commencing in August proceeding to the S.W. Mr. Jerdon remarked it "on the Coonoor Pass of the Nilgiris, and about the edges of the hills. It flies in large flocks and with very great speed." Its nests remain to be discovered in this country.

C. FUCIPHAGA; *Hirundo fuciphaga*, Thunberg. A minute species, about $3\frac{1}{2}$ in. in length by 9 in. in expanse; the tail $1\frac{1}{2}$ in. and even; wing, $3\frac{3}{4}$ in. Colour above blackish, green and purple glossed; below fuscous-brown, passing to white on the middle of the belly, with whitish edges to the lower tail-coverts. A single large feather, with a distinct supplementary plumelet, grows on the hind toe, being nearly as long as the toe with its claw: this is always normally present, but is often lost in dry specimens.

This bird is the edible nest-builder of the Bay of Bengal, and may prove to be exclusively a coast species, the nests of which are of superior quality to those of *C. nidifica*? In the extreme east it is perhaps replaced by *C. troglodytes* of Mr. G. R. Gray. The Rev. J. Barbe, from personal observation, notices it as "common in the Archipelago of Mergui, the Nicobars, &c.,

building their nests in the cavities of the rocks, where it is most difficult and perilous to have access. Formerly," he adds, "both Malays and Burmese procured at the Andamans a considerable quantity of these nests, collecting them themselves or receiving them from the islanders in exchange for their tobacco, &c."* But it appears that both people, "taking advantage of the time in which the natives were on board their vessels, tied them up and carried them off as slaves." Hence the present hostility of the rude Papuan inhabitants of the Andaman Islands to all foreigners whatsoever.

Subfam. MACROPTERYGIINÆ.

True Swifts in external structure, but with exceedingly short tarsi, and toes pointed as in the class generally, *i. e.*, the first or hind toe consists of one phalanx besides the ungual, the second or inner toe of two, the third or middle one of three, and the fourth or outer of four; hence these birds are often seen to perch. Their anatomy does not appear to have been examined, though of especial interest. One genus only is known†:—

MACROPTERYX, Swainson (Crested Jungle Swifts).

The species of which are remarkable for their beauty, having delicate silky plumage, elongated on the crown to form an erectile and somewhat pointed crest. The wings are exceedingly long in the two following species, less so in others, and have their first two primaries subequal. Tail deeply forked. The ear-coverts (in probably all the species) are rufous or ferruginous in the males, dark in the females.

Four species have been ascertained, which inhabit India, the

* J. A. S. xv. 363.

† Unless *Atticora*, Boie, ranges here? Mr. G. R. Gray refers it to his *Hirundininae*; and assuredly *Hirundo fasciata*, Lath., assigned to this genus by Mr. Gray, appears to be a true Swallow (with twelve tail-feathers, &c.), as figured by Mr. Swainson in his 'Zoological Illustrations.' But *Atticora leucosternon*, Gould, B. A., pt. ix., is a Swift, to judge both from his figure and account of its habits; Mr. Coxen's statement quoted by him, that it chooses for its nest the deserted hole of certain small burrowing Mammalia, "in the side of which it burrows for about seven or nine inches in a horizontal direction, making no nest, but merely laying its eggs on the bare sand," being the only inconsistency with the habits of other *Cypselidæ*, and indeed *Hirundinidæ* also—so far as in not preparing a nest.

Malayan Peninsula, and the Austral-Asian Archipelago generally, as far as N. Guinea. *Cypselus parvus*, Licht., of Africa, is supposed by Mr. Gray to constitute a fifth. They inhabit extensive tracts of high jungle, and the Indian species, remarks Mr. Jerdon, "frequently perches on bare and leafless trees. While on the wing it has a loud Parrot-like cry, very different from that of other Swifts. The elegant frontal crest is frequently raised when the bird is sitting."

The four oriental species might range in two sections,—those which have very long wings (as the two described below),—and those with shorter wings (as *M. comatus* and *M. mystaceus*), which are most elegantly adorned with long white supercilia and moustaches, respectively continued backward from a white forehead and white throat. The colouring of the latter is still richer, with finer contrasts of hues, than in the two following species.

M. CORONATUS; *Hirundo coronata*, Tickell, J. A. S. ii. 580; *M. klecho* (v. *longipennis*) of India, auctorum, described J. A. S. xv. 21. Outer tail-feathers reaching $1\frac{1}{2}$ in. beyond the tips of the wings. Chin and sides of throat of the male, besides the ear-coverts, ferruginous, replaced in the female by black, with a whitish line bordering the throat. Colour bluish grey, infuscated, purer on the back and rump; paler on the belly, and passing to whitish on the middle of belly and lower tail-coverts; fore part of the wings glossed with purple, the rest of the plumage with green. "Irides deep brown; bill black; legs bluish black; soles of feet reddish white" (Jerdon). Length of wing, $6\frac{1}{4}$ in.; of middle tail-feathers, $1\frac{3}{4}$ in.; the outermost $5\frac{1}{4}$ in., and passing the next by about 2 in. (more or less).

Inhabits the high forest jungles of peninsular India in large flocks, "being partially met with," remarks Captain Tickell, "hovering over the marshy spaces in the jungles. They disappear in these regions" (Birbhúm, &c.) "by the end of March, but I could never trace the direction of their flight." In a late communication the same gentleman remarks:—"This species is very common, but local, resorting entirely to tree jungle, and chiefly marshy ponds in the close vicinity of forests. It has a monotonous squeak, resembling the cry 'kya' of a Parrakeet flying along. These birds are very gregarious, and pass the heat of the day in the forest, perching all together on some limb of a lofty

dry tree. The male has at such times a curious sibilous note, imitated by the syllables 'chiffle-chaffle, chiffle-chaffle,' &c., and not very unlike the song of the Chimney Swallow. The Hos, or Surka Coles, call it the Topee Hén or Crowned Swallow, and assure me it lays three or four white eggs in holes in lofty decayed sál trees; but I have never seen nest or eggs." Further south Mr. Jerdon observed this species "in high forest jungle in the neighbourhood of hills. I have seen it," he adds, "in Goomsoor, at the foot of the Nilgiris, and in various parts of the jungle of the western coast."

M. KLECHO; *Hirundo klecho*, Horsfield; *Cypselus longipennis*, Tem., figured in Swainson's Zool. Ill., 2nd series, pl. 47. Outer tail-feathers not passing beyond the tips of the wings; ear-coverts only of the male deep maroon; crested crown, back and wings, finely glossed with dark green, sometimes bronzed; rump and upper tail-coverts bluish grey, extending less up the back than in *M. coronatus*; under parts ash-gray, passing to white on the middle of belly and lower tail-coverts; tertiaries albescent. In the young the tertiaries are white-tipped; the coronal feathers have rufous tips; and those of at least the middle of the breast are whitish, with subterminal dusky band.* Wing, $6\frac{1}{2}$ in.; middle tail-feathers, $1\frac{3}{4}$ in.; outermost, $3\frac{3}{4}$ in., passing the next by $\frac{3}{4}$ in. only.

Inhabits the Malayan Peninsula, Sumatra, and Java. *M. comatus* is said also to inhabit Sumatra, in which case its range would probably extend into the Malayan Peninsula.

Note.—As the European *Cypselus apus* (L.) is a common summer visitant in Afghanistan, it should be looked for in the N.W. Provinces of India. Two of the Indian species, *Cypselus affinis* and *C. balasiensis*, do not migrate; perhaps also *Collocalia fuciphaga* in the Bay of Bengal; but all the other Indian *Cypselidæ* appear to be migratory; and the migrations of some of them probably do not extend out of the country—*Macropteryx coronatus*, for instance, which is well distinguished from its Malayan affine, *M. klecho*. Again, we have the little-observed

* "In young birds the abdomen is whitish, and the wing-coverts are banded with white at their extremities. The feathers covering the back and the quill-feathers are tipped with brownish grey." (Horsfield) Linn. Tr. xiii. 143.

Cypselus leuconyx of India, quite distinct from the nearly-allied *C. vittatus* of the countries lying eastward of the Bay of Bengal; and a similar distinction probably exists between Mr. Strickland's large and blacker Malacca variety of *C. affinis* and the bird so called of India, the more especially as *C. affinis* is a permanently resident species, which does not appear to be subject to any variation, and moreover does not seem to inhabit the intervening Burmese countries. Lastly, we have a remarkable fact in the respective limitation of range of the two large species of *Acanthylis*, neither of which has hitherto been observed in the regions inhabited or visited by the other, though both are known to be migratory. The times of arrival and departure of the various migrant species in different parts of the country, north and south especially, and in mountains or valleys, require to be noticed and recorded.

PS.—Since the foregoing paper was printed we have seen Sir Everard Home's article on the subject of the gastric glands of what he supposed to be the edible nest-building "Swallow," published in the 'Philosophical Transactions,' vol. cvii. (1817), p. 332. He mentions that Sir S. Raffles had given him some of the nests, concerning the composition of which that observer "gave it decidedly as his own opinion that, whatever it is, it is brought up from the stomach, and requires at times so great an effort as to bring up blood, the stain of which is seen on the nest." But it does not appear that Sir S. Raffles supplied the specimen of the bird examined by Home, which could scarcely be of the genus *Collocalia*, if, as Sir E. Home states, "This bird is double the size of our common Swallow," i. e., *Hirundo rustica*, a statement which is confirmed by his fig. 1 of the plate, "magnified twice in diameter, or four times in superficies," and representing accordingly the stomach of a much larger bird than any known species of *Collocalia*. The structure of the proventricular glands figured by Home, as those of the producer of the edible nests, is so very curious and remarkable, and withal so conspicuously different from the structure ordinarily observable in the class, that we imagined we could not well have overlooked it even with the naked eye; and, upon submitting the gastric glands of *Collocalia fuciphaga*, *Cypselus affinis*, and *C. balasiensis* to microscopical inspection, we found in neither of these species a

trace of the peculiar petal-like appendages to the glands which Home has represented.

Moreover, this author remarks:—"The present provision for forming a nest out of its own secretions, in an animal of so high a grade as the class *Aves*, strikes us with astonishment, since birds in all other countries find substances of some kind or other out of which they form their nests, and makes it evident that this particular bird, at the time of its first creation, was intended to inhabit the caverns of Java, in which nothing is to be met with out of which a nest could be constructed," &c. As if the bird never passed out of the cavern! While other *Cypselidæ* inhabiting the same caverns do employ other substances: again, *intended to inhabit caverns* might be advantageously substituted for "the caverns of Java" exclusively, albeit the group may be confined in its range to S.E. Asia and its islands.

Addendum.—Edible nests in Ceylon. A most obliging correspondent in Ceylon, Mr. E. L. Layard, informs us that he has learned of a habitat for *Collocalia* in that island, "on the banks of a river, thirty miles from the sea, in some caves of a high mountain. A Chinaman rents them from Government, and pays £40 for a period of seven years. This man says there are two kinds, but does not know much about them; I will, if possible, visit the spot during the 'take,' which comes on four times a year, October being the forthcoming. This quadruple harvest would seem to imply that they do not migrate, as all our other species [of Swift and Swallow] assuredly do."

Our friend, Capt. Lewis, who saw much of these birds in the Nicobars, having opportunely returned to Calcutta after a long absence, we had an opportunity of submitting the accompanying notice of them to his criticism; and he states positively that he observed but one species in those islands, the *C. fuciphaga*, of which he preserved numerous specimens, both adults and young from the nests, and remarks that they laid two or three white eggs, commonly the latter number, but he thinks he once observed as many as four. The number may, in fact, vary according to season (Capt. Lewis observing them in the cold weather). He remarks that the gatherers of the nests are much given to mislead enquirers who interrogate them on the subject, which may account for the published statements that *C. fuciphaga*

does not produce a valuable nest. The notice which we have given, from M. Hooyman, of the manners and building-places of *C. nidifica*, he says applies equally to those of *C. fuciphaga* in every particular; and especially he has often remarked that they retire early in the afternoon to their caverns (*i. e.*, about 4 p.m.); but he states that the edible nests, as we see them, are only the lining which comes out entire, though independently affixed to the rock, being underlaid by a network of some vegetable fibrous substance placed on the ledges, which the gatherers are careful never to remove. Further attention is invited to this subject.

ON THE ORIGIN OF THE DOMESTIC COCK.*

By E. CAMBRIDGE PHILLIPS, F.L.S.

It is universally admitted that the English game fowl has been carefully bred in this country and kept in its purity for many centuries. Introduced here by the Cæsars (a favourite pastime of the Romans being cock-fighting, and copied by them from the Greeks, who most probably obtained their fighting birds originally from the far East), the English game fowl stands alone in its great antiquity, its beauty, and marvellous courage, far above all other breeds of our domestic poultry.

During the past twenty-five years I have kept at various times all the different varieties of game fowl, and more particularly the pure white bird with yellow legs and bill. I purpose therefore recording the following experiences I have had in crossing White game with Black-red game and other poultry, the results in each case being so surprising, and so very different to my expectations, that I venture to hope they may be found of some interest to naturalists and ornithologists in throwing some faint light upon the origin of the domestic cock, the subject of this paper.

As this will probably be read out of England, it may not be

* From experiments made in crossing some of the different varieties of pure English game fowls with each other, and also in crossing game fowls with common domestic poultry. A paper read at the Ornithological Congress at Vienna, April, 1884.

out of place to state shortly the various breeds of game fowl alluded to in this paper, with a short description of each.

First is the "Black-red game," the oldest breed of all, and I think the purest. The cock has the head bright orange in colour; comb, single, serrated, and red; eyes, bright red; face, red; hackle, bright orange, without any markings; back, dark rich red; shoulders and shoulder-coverts, red; wing-butt, black; bow, red; greater and lesser coverts, brilliant lustrous black, forming a distinct bar; primaries, black; secondaries, outer web bay, black inner web; saddle, red; tail, black; breast, black; legs, either willow, blue, olive, or yellow; one very old breed, however, which is very scarce, called the Derby red, has, as its distinctive mark, white legs, and occasionally a white feather in its tail, which last feature in all other black-reds is considered a sign of the greatest impurity.

Black-red hen.—Eyes, bright red; neck-hackle, golden, with black stripes; back and shoulder coverts, wing-bow, shoulder, and coverts, partridge-colour; tail, black and brown; breast and thighs, salmon-colour; legs, as in cock.

"White game."—Plumage, entirely white; comb, red; legs, orange-yellow; eye red (this applies to both cock and hen).

"Piles," or "Pied game," are common enough in the British Islands, and were originally obtained by crossing White game with Black-red game.

The cock may be very shortly described as being the same colour as a Black-red cock, but where the Black-red is black the Pile is white.

The Pile hen has comb, face, and eyes, red; neck, golden; breast, salmon-colour; tail, white; rest of plumage white, with yellow or red; legs, yellow or willow.

"Blue game" are now very scarce; they are marked, both cocks and hens, the same as Piles, except that where a Pile is white a Blue is of a dull blue colour; legs dark blue.

"Cuckoo game" are still rarer, and I have seen but very few in this country; they are marked something like the breast of a Cuckoo, *Cuculus canorus*, from whence they take their name, their entire plumage being a light bluish grey, each feather being barred with bands of a darker grey, *no red*; legs, in the few I have seen, yellow.

I need hardly add that the comb in all game fowls should be

single, small and serrated, wattles small, with red deaf ear; their whole plumage very hard and short, and their general appearance elegant, fearless, and defiant.

There are several other varieties of pure game fowl common here, besides those I have mentioned; but as they are only very briefly alluded to in this paper it is hardly worth while describing them. I may, however, add that they are principally Brown-reds, Duck-wings, Blacks, Birchens, Ginger-reds, and Hennies, this last variety having the tails of the cocks exactly the same as in the hens, hence their name. In all these varieties, even in pure Black, the black metallic bar on the wing is distinctly visible or traceable (except perhaps in Whites and Piles); and this may also be said of most of the common farmyard poultry of the country. In many of the Black-red cocks, especially when permitted to have a wide range of ground, and wood-covers to roam over, there is often a tendency to droop the tail, but I think the contrary is the case amongst birds constantly exhibited or much confined.

Being possessed of a very old breed of White game, I determined, about sixteen years ago, to breed some Piles, and for this purpose I procured a very well-bred Black-red game hen with willow legs, to which I put an excellent White game cock, a prize-winner. From these I obtained a hatch of chickens, out of which only one turned out an indifferent Pile hen, whilst the rest were all Blues; these showed such high breeding that I kept the best of them, and, not being able to obtain any other Blues in order to introduce fresh blood, I bred from brother and sister. To my great astonishment they bred true Blues, very good birds, with not the slightest trace of white among them, the only perceptible difference being that the red in both the cocks and hens so bred was more abundant than in the parent Blues, and I have no doubt but that in a few more generations they would have relapsed into common red fowls—that is, red cocks and brown hens, with more or less of the elegance of the game fowl. On the other hand, had fresh blue blood been introduced, a permanent breed of great beauty might have been established. I omitted to say their legs were blue. I was unable to carry on the cross further, a game-fancier having been so struck with them on seeing them that he bought them at a high price.

Having afterwards bred from the White cock above mentioned

and a pure White game hen, some excellent Whites, and having among them a very troublesome young White cock that annoyed everyone with his fighting propensities, I placed him at my stables, some little distance away in the village, where I then resided. Close to this stable lived a farmer, who had a fine breed of Dorkings and other common farm-yard poultry, of which he kept a number. The first thing that happened was my young White cock (in spite of everything) killed all the farmer's cocks that would stand up to him (he was the most determined fighter I ever saw), and he then possessed himself of all the hens, and as he was a fine bird he was allowed to remain with them, some large table-birds being expected from the cross. A great many chickens were the result, but all small, and all Blues, showing no white, and being in colour like Blue game, all with single combs and dark legs, and with some of the elegance of the game fowl in their appearance. I afterwards disposed of this White game cockerel, and his progeny the Blue farmyard cross were allowed to breed with each other. In about three seasons all trace of blue colour had disappeared, and they had relapsed into common Red single-combed cocks, more or less barred on the wing, whilst the hens appeared common Brown single-combed birds, scarcely, if at all, distinguishable from the common Barn-door fowl of the country.

Some years after this, thinking to obtain some more Blues, as their scarcity made them valuable, I again obtained a good Black-red hen, to which I put a pure White game cock of the same strain as the White cock first mentioned, but, alas, " 'Tis not in mortals to command success." The chickens turned out all Cuckoo game of the purest type, both cockerels and pullets, without red, most regularly barred over the entire body and very beautiful. I parted with them to a friend of mine, who is a game fancier, and he bred from them. The result was exactly the same as in the Blues, the birds got smaller, the consequence probably of breeding from brother and sister, whilst over them, especially in the cock, red feathers were sprinkled. They were afterwards sold, and I have never seen any Cuckoo game since, but I have little doubt that if their descendants had been permitted to breed with each other they would have developed ultimately into cocks, more or less red, and hens brown or partridge-coloured; whilst on the other hand, as in the Blues,

the introduction of fresh Cuckoo game blood, and a little care in breeding, would have established a permanent breed of this variety.

From the above it will be seen that although birds of a marked different variety were bred from, namely, Black-reds and Whites, producing birds of two other very pronounced varieties, namely, Blues and Cuckoos; yet directly these were allowed to breed *inter se* (among themselves), or to cross with common poultry, as in the case of the White cock with the farmyard poultry, they all, although retaining their different colours for some length of time, gradually relapsed into Red cocks and Brown hens. In fact there seemed a strong determination, both in the Blues and Cuckoos, to throw back to red cocks and dark brown hens. I find also that in breeding pure Whites, as well as with pure Black game (a very beautiful variety), constant introduction of fresh blood is needed to keep out the red colour, which without it is almost certain to reappear in each successive brood.

In nearly all farmyards in this country where the poultry are not carefully looked after, and are allowed to breed as they like, one invariably sees a common Red cock sometimes with a black breast, but in all cases with a distinct bar more or less strongly marked on the wing, and hens of various shades of brown.

This bar on the wing, like the double wing bar so strongly marked on the Wild Rock Dove, *Columba livia*, and in the numerous varieties of its tame descendants, seems to be the principal and permanent distinguishing mark that has come down, through a long course of years, from the original stock of our domestic poultry; and so strongly does it reassert itself that I have remarked that in instances where a Buff Cochin cock has been turned down in a farmyard with the intention of improving and enlarging the breed of common farmyard poultry, yet directly the descendants of this cross were allowed to breed among themselves what has been the result? First, the bar on the wing made its appearance in a greater or less degree. Next, the cocks became red and the hens brown, and both showed only a slight trace of their Cochin ancestor in their fluffy sterns, and somewhat shorter tails. Gradually even these evidences of Cochin blood disappeared, and in a very few generations the cocks relapsed into the common Red, and the hens into the common Brown, birds of the country.

The result is also precisely the same where a Black Polish cock with a large crest (a breed of some antiquity) has been mated with common poultry, and their progeny allowed to breed together. The colour of the Polish cock is the first to disappear, getting redder and redder, then the crest gets smaller and smaller in each successive generation, until it gradually dies out altogether and no trace of it remains, except a few feathers on the head, almost an apology for a crest, which very occasionally reappear from time to time.

When we consider the enormous care and length of time it must have taken to produce birds of so essentially different types as Cochins and Polish, and when we see how quickly these types disappear altogether when interbred with common poultry, I think this and the results above mentioned may be taken as some evidence of at least the colour of the original stock of our domestic poultry.

With regard to comb, I have never among the numbers of game fowls I have bred during the past twenty-five years ever seen a single instance of anything but a single serrated comb, and even when game is crossed with the Malay the pea comb of the latter bird entirely disappears after the fifth generation. On the other hand, I have often seen the single comb appear among such carefully bred birds as Sebrights and Black Bantams, both of which varieties have exceedingly well defined double combs.

I have also occasionally observed it in the various varieties of the Hamburg fowl, all of which have very large double combs.

Although the origin of the domestic cock is lost in the obscurity of ages, yet it may possibly be gleaned from the above experiences that originally the domestic cock sprang from a bird somewhat resembling the Black-red game cock in colour, although probably with some slight mottling on the breast, and with a greater metallic brilliancy of plumage, with a red eye, small wattles, and single serrated comb, dark or dark blue coloured legs of medium length, with a rather drooping tail, and that its general appearance was a little heavier than in the present highly bred English game fowl; that the hen was brown, marked something like a Black-red game hen, with a very small single serrated comb, resembling the cock in general contour, and colour of leg and eye, but darker than the present Black-red game hen, and probably more inclining to grouse colour than to partridge.

ON A NEW SPECIES OF BRITISH WREN.

BY HENRY SEEBOHM.

THE readers of my 'History of British Birds' are familiar with the name of Mr. Charles Dixon, the author of 'Rural Bird Life,' and most of them will doubtless have appreciated his field notes, especially those made during his visit to Algeria in 1882. This year I arranged for him to visit St. Kilda, to procure some notes respecting the birds of that interesting island for my forthcoming volume. Amongst other valuable information he has ascertained the existence of a Wren on St. Kilda, and has brought home a skin of one of them, which differs in many important respects from either the European or the Faroe Island forms. Those ornithologists who regard the climatic races of this bird as distinct species, will probably come to the conclusion that the St. Kilda Wren is one of the most distinct, and I propose to name it *Troglodytes hirtensis*, Hirta being the Gaelic name of St. Kilda. If the climatic races of the Common Wren be regarded as not worthy of specific rank, the St. Kilda Wren may be described as *Troglodytes parvulus hirtensis*, which is a contraction of *Troglodytes parvulus*, var. *hirtensis*, or of *Troglodytes parvulus*, subsp. *hirtensis*, and is the style of nomenclature adopted by the best ornithologists of America, and will no doubt, in a very short time, be that adopted by the best ornithologists of England also. The St. Kilda Wren most nearly resembles *Troglodytes parvulus pallescens*, from the Western Aleutian Islands, but is much more distinctly barred on the back and head, and almost free from any traces of spots on the throat and breast. In general colour it is quite as pale and slightly greyer than examples of *Troglodytes parvulus pallidus* from Algeria and Turkestan. The bill resembles that of *Troglodytes parvulus borealis* from the Faroe Islands. The eye-stripe is as distinct as in typical examples from Europe, a character which is least developed in *T. parvulus nipalensis* and *T. parvulus fumigatus*.

These various forms of Wren appear to differ in colour according to climate, and not according to geographical distribution, except so far as it happens to be connected with climate. In Algeria, Turkestan, and Cashmere, where the rain-

fall is only a few inches, the colour is very pale and grey. In Sikkim, where the rainfall is a few yards, the colour is very dark and rufous. The other characters relied upon to diagnose the supposed species appear to intergrade in every direction. The absence of an eye-stripe seems to be correlated with the presence of bars on the throat and breast. These characters



TROGLODYTES HIRTENSIS, Seeböhm.

are strongest in *T. nipalensis*, less developed in *T. fumigatus* and almost or quite lost in the other forms. The bars on the back are most developed in *T. hirtensis*, less so in *T. pallescens*, still less so in *T. bergensis*, but always fairly developed in some examples from every locality, perhaps least so in those from England. The greater the number of examples which may be examined, the more clearly appears the fact that it is impossible to draw a hard-and-fast line between any of the climatic races of the Common Wren, which is an excellent example of a widely-

distributed species in the process of being differentiated into a dozen species. Some ornithologists may exclaim, How is it possible that intermediate forms can exist between a Himalayan species and another isolated in Japan? I can only suggest that the Japanese and Himalayan birds were formerly one species, that the birds in the Himalayas and in the extreme south of Japan are so still, but that further north in Japan a change of climate has produced a change of plumage.

The St. Kilda Wren has been obliged by force of circumstances to change its habits, as well as the colour of its dress. Stranded on an island where there is not a tree or a shrub, not even a bush of heather, it picks up its food on the water and rocks, and has, in fact, become a rock wren. In all probability it has gradually acquired its grey colour and barred back, by the slow process of protective selections, and is now almost invisible to the eyes of the hungry hawks that visit St. Kilda, as it flits about the grey lichen-pitted rocks. It would be interesting to know how many thousand years ago the accident happened which gave St. Kilda a Wren. Doubtless some flock of Norwegian birds, migrating southwards to find a milder winter in Great Britain, were driven out of their course and took refuge on the lonely Atlantic island, where their descendants, modified by time and circumstances, still survive. Let us hope that they will succeed in baffling the skill of all persecutors of rare birds, and for ages yet to come enjoy their barren home.

NOTES AND QUERIES.

Zoological Nomenclature.—On July 1st a meeting of naturalists was held in the Lecture Room of the Natural History Museum, South Kensington, to consider the expediency or otherwise of adopting the system of trinomial nomenclature advocated by American zoologists. The chair was taken by Prof. Flower, F.R.S., and, after papers on the subject had been read by Mr. R. B. Sharpe and Mr. H. Seebohm, Dr. Elliot Coues (at present on a visit to this country) gave a lucid explanation of the views now held by American ornithologists with regard to zoological nomenclature, the substance of which will be found in his address to the National Academy of Sciences, Washington, printed in our last number (pp. 241—247). A discussion followed, in which Dr. Günther, Dr. P. L. Selater,

Mr. Blanford, Prof. F. J. Bell, Mr. W. F. Kirby, Lord Walsingham, Dr. Sharp, Dr. H. B. Woodward, Mr. H. T. Wharton, Mr. Howard Saunders, Dr. Traquair, and Mr. J. E. Harting took part, and after Dr. Coues had replied, Prof. Flower summed up the discussion, and the proceedings terminated with a vote of thanks to the Chairman. No formal resolution was passed: the meeting having been convened merely for the purpose of eliciting the opinions of specialists on the advantages and disadvantages likely to attend the adoption of the system of nomenclature proposed. A full report of the papers read and of the discussion which followed will be found in 'Nature' for July 10th and July 17th.

Protection of Wild Birds in India.—Under the auspices of the East India Association a meeting was held on July 11th at the Zoological Society's Rooms in Hanover Square, to hear a paper read by Mr. R. H. Elliott "on the need for a Wild Birds Protection Act for India." The chair was occupied by Prof. Flower, F.R.S., President of the Society, and the meeting was attended by a number of well-known naturalists. On the conclusion of the paper it was criticised by Mr. Grote, Sir Joseph Fayrer, Mr. R. B. Sharpe, Dr. Hyde Clarke, Dr. P. L. Selater, and Mr. J. E. Harting, and at the suggestion of the Chairman, Mr. Elliot moved a formal resolution to the effect that, in the opinion of the meeting, it was desirable that the local governments in India should take such steps to frame and put in force such legislative measures as should appear best calculated to secure a close time for wild birds in India. This resolution having been put to the meeting, was declared to be carried, and the proceedings terminated with a vote of thanks to the Chairman. An epitome of Mr. Elliot's paper and a report of the discussion which ensued upon it will be found in 'The Field' of July 19th (p. 99).

The Hunterian Museum.—The vacancy in the conservatorship of the Museum of the Royal College of Surgeons, Lincoln's Inn Fields, caused by the appointment of Prof. Flower to be Director of the Natural History Museum, South Kensington, has only recently been filled. The new Conservator is Mr. Charles Stewart, M.R.C.S.L., F.L.S., whose experience as Lecturer on Comparative Anatomy and Pathology at St. Thomas's Hospital and Conservator of the Museum there, well qualifies him for the post, and who is moreover well known for his scientific attainments.

MAMMALIA.

Deer killed by Lightning.—A keeper of the Duke of Portland, writing to a contemporary, states that during the severe thunderstorm on the night of July 9th, the lightning struck an oak tree in Welbeck Park, killing three deer: two of them were close to the tree, but one was about ten or twelve yards off. All the deaths seemed to be instantaneous. He adds:—

"This may not seem to be anything extraordinary, but when I say that an occurrence of this sort has not taken place in my lifetime in this park, it makes it remarkable to me. I may also say that my father and grandfather never knew lightning to kill deer in this park, and that time extends to a period of 120 years. Now, as our park is well wooded with oak, and very rarely a year passes without several trees being struck with lightning, it makes this occurrence more remarkable. The bark of this tree was thrown a distance of sixty yards. Other trees were struck the same night, but I have not found any more dead deer."

Weasel swimming.—Walking along the river "wall" near here on the 24th June last, I saw a short distance ahead a strange-looking object swimming across the river to the opposite side, which on landing proved to be a Weasel, carrying in its mouth a young one, to all appearance more than half the size of its parent. On landing she found herself suddenly face to face with two colts, upon which she dropped the youngster and ran into a clump of brambles and nettles close at hand, but almost immediately returned; and again taking up the young one she went "looping" along through the long grass at a pace which, considering the weight of her burden and the shortness of her legs, was really wonderful. I could not see what ultimately became of her, but at the time I lost sight of her she was apparently making for a tall thick hedge bordering a ditch, where perhaps she had already fixed upon some safe retreat for her family. I have more than once seen a Stoat swimming,—probably a matter of common occurrence with that species, which is very partial to the banks of rivers, watercourses, ditches, &c., where it preys upon the rats, water rats, meadow mice (*A. agrestis*), young waterhens, &c., to be found in such places. Only last spring I saw one cross a small stream carrying some object which I took to be a large meadow mouse, but was not near enough to be quite certain. The Weasel in this district is much scarcer than the Stoat, but neither can by any means be called common, being everywhere persecuted with the utmost rigour by gamekeepers; besides which the objectionable practice of destroying rats and mice by means of poison, which has become so prevalent of late years, must be very fatal to both species, not to mention the Hedgehog, the poisoned rats and mice being in all probability devoured by all three. It is a great pity that the pretty and very useful little "Mouse-hunt" should be so dealt with.—G. T. ROPE (Blaxhall, Suffolk).

Grey Seal in the Channel Islands.—On the 26th June last a Seal was captured by some soldiers of the 36th Regiment near the barracks at Grève de Lecq, Jersey, which seems to have puzzled the naturalists of Jersey. It was first announced in the 'Jersey Times' of June 27th as a Walrus, and the measurements there given were much exaggerated, a foot

being added to its length and about four feet to its circumference! According to another report it was a Sea-lion, *Otaria jubata*, although why this species should have been fixed upon it is difficult to say, seeing that it is a native of the southern shores of South America from Peru and Chili on the Pacific coast to Rio on the Atlantic side, and has never been met with north of the Equator. Moreover, no species of the *Otariidæ* is known in the North Atlantic. Fortunately Mr. F. P. Pascoe, who happened to be staying in Jersey at the time, secured a photograph of the animal, which he very kindly forwarded, and this shows it to be the Grey Seal (*H. grypus*), which has been met with on various parts of our coast from Shetland to the Isle of Wight. Mr. J. Sinel, of Jersey, in whose hands the animal has been placed for preservation, has been good enough to send particulars, and states that the entire length was 7 ft. 7 in., greatest girth 4 ft. 8 in., and estimated weight about 500 lbs.; the brain barely 1 lb. It proved to be an adult male, with the teeth much worn.—J. E. HARTING.

BIRDS.

Flamingo shot in Hampshire.—The following particulars concerning a Flamingo, which was shot in Hampshire in November last, have been communicated by Lord Henry Scott to Lord Walsingham, who has very kindly forwarded them for publication:—

“I have referred back to my journal, and find that the Flamingo was shot on the 26th of November, 1883. It had been flying about on the mud-banks outside the Beaulieu river for about a fortnight previously, and many people had gone out to try to shoot it. It was very wild and wary, and no one had been able to get within gunshot of it, as it was able to fly extremely well, and never allowed any boat to approach near enough to it. The coast-guardsmen frequently shot at it with their rifles. When I heard that the bird was being thus shot at, and had been at the mouth of the river so long, I sent a keeper of mine (a naval pensioner and a capital hand with the punt-gun) in the gunning-punt to try to get the bird for me. In this he succeeded, but he was not able to get nearer than about 120 yards. He was laying the punt-gun on the bird at about that distance, hoping he might get nearer and shoot it with the shoulder-gun, when the Flamingo, being on the alert and very wild, rose on the wing, and my keeper Goff fired the punt-gun at him and brought him down with three shots through him. The bird is a very fine grown one, quite pink all over, and with a good scarlet wing. There was nothing to show that it could have been at any time in captivity, for its wings were quite perfect, and it was extremely wild and could fly well, taking long flights. I cannot remember much about the weather previous to the bird being seen off the Beaulieu river, for I only returned home on the 20th from Scotland; but there had been a great gale from the south-west about a fortnight before, and it is my belief

that the Flamingo had been blown by this gale to the British shores. Whether he came from North Africa or from the South of France (mouth of the Rhone) it is impossible to tell; but that the bird was a wild one, and had been blown to England by stress of weather, I have no doubt."—H. J. SCOTT.

Unusual Variety of the Snipe.—I have been intending for some time past to send you a note of a variety of the Common Snipe, intermediate in general colouring between the so-called "Sabine's Snipe" and the common species, though approximating more nearly to the latter. It was bought at a poulterer's at Hastings in the winter of 1881-2, and was killed in the vicinity. It was secured by Mr. Sorrell, who showed it to me when at St. Leonards some time afterwards. Having recently seen the collections of Mr. Bond and Mr. Whitaker, I may state from recollection that there is no variety of the Common Snipe in either of these fine collections like the Hastings bird, but, if a comparison could be made, it would probably be found to be like the Irish specimen recorded by you in 'The Zoologist' for July (p. 272).—J. H. GURNEY, JUN. (Hill House, Northrepps, Norwich).

Rose-coloured Pastor in Sutherlandshire.—A fine male of *Pastor roseus* was shot, with another example, at Bordighera, on June 7th, and brought in the flesh to my sister, by the owner of the cherry orchard which it had frequented. It seems not improbable that they might have nested in the neighbourhood had they escaped molestation. A female of *P. roseus* was shot about the same time in Sutherlandshire, and sent in the flesh to Macleay, of Inverness, who showed it to me when just set up.—H. A. MACPHERSON (Carlisle).

Curious Site for a Redstart's Nest.—When nesting in the big wood here in April last, I saw a Redstart fly out of some dead leaves, and on looking found a nest with six eggs. The nest was on the ground under the leaves, and a run of about six inches through the leaves led to it. I have seen many nests of this bird, but none in this situation before.—J. WHITAKER (Rainworth Lodge, Mansfield).

Fieldfares and Redwings.—In reference to Mr. Young's note (p. 228) on the scarcity of Fieldfares and Redwings during the past winter, I may say that here both species were very abundant up to the end of November. I noticed Redwings (eight birds) first on October 6th, and Fieldfares (a flock of about fifty) on November 3rd. On the 10th and 11th of that month my diary runs:—"Very large numbers of Fieldfares, more than I have seen for two or three years—several considerable flocks. Many Redwings. Fieldfares in great abundance." I don't think I ever went into the Cherwell meadows all the winter without seeing a few of both species. The last

Fieldfares I saw were two birds flying over on April 23rd.—OLIVER V. APLIN (Great Bourton, near Banbury, Oxon).

Note on the Nightjar.—Having had exceptional opportunities this summer, in Berkshire, of watching the habits of this curious bird, I venture to send the following remarks:—On its arrival, about the end of April or beginning of May, it is much bolder than it is later in the season. The note is loud and discordant then, and it is easy in the twilight to walk to the tree on which it may be sitting lengthwise on the branch, with head low. If disturbed it gives a peevish hoot and claps its wings together behind, after the manner of some pigeons, pausing an instant after each clap to recover its equilibrium. Later on, as the breeding season approaches, its note becomes very ventriloquial, and it is then sometimes very difficult to stalk. The jarring note becomes much softer, and sometimes resembles the purring of a cat. If roused from its perch whilst making this noise, it continues the same note, letting it grow fainter till it dies away, and then gives the cry, or "hoot," which is always uttered on the wing. The bird rarely appears in daylight, though I have heard one occasionally during the brightest summer afternoon. At half-past eight, at midsummer, they begin to appear, and continue till shortly after ten, but on moonlight evenings they may be heard till midnight. They lay earlier in the year than is generally supposed, on June 25th, I found two "nests" (?), each containing eggs; one lot had been sat on for some little time; and a keeper assured me that on June 19th he found young birds. When the hen is disturbed on her nest, if only one egg is laid, she flies straight away; but if she is sitting she will draw the intruder away by feigning a broken wing, at the same time uttering a cry of distress. The eggs are laid on the ground, not the slightest pretence of a nest being made; in one case, however, some fallen pine-needles had been scraped away till the bare soil was reached. The hen bird appears to select her breeding-place some time before laying, notwithstanding the absence of a nest. When the eggs are reached there is difficulty in seeing them, so much do they resemble the ground; few better examples of "protective mimicry" could be given, the eggs exactly matching in colour the leaden sand with its white stones found in the district of Berkshire where these notes were taken.—T. N. POSTLETHWAITE (Millom, Cumberland).

Hen Harrier breeding in Dorsetshire.—The occurrence of a pair of Hen Harriers nesting this year in Dorsetshire seems worth recording. They selected a spot dangerously near a preserve, and the female bird forfeited her life after her fifth or sixth day of incubation, as the pair were flying home with a young duck and pheasant. The first egg was laid on the bare ground in a bed of rushes, which was afterwards made more comfortable by bits of grass being scratched together. Although she

apparently began to sit after laying the second egg, she subsequently laid two more. There were four in the nest when she was killed, which catastrophe occurred about a month ago. I saw a male Hen Harrier the day before yesterday (July 9th) in the neighbourhood, which was probably the mate of the other. The Poole Estuary is crowded with the Black-headed Gulls, young and old; they must have had a good breeding season.—J. C. MANSEL PLEYDELL (Whatcombe, Blandford).

Montagu's Harrier in Nottinghamshire.—A neighbour brought me a hawk which he had taken out of a pole-trap on the Forest, which, as it was not at all injured, I kept for a few weeks and then sent on to the Zoological Gardens. It was a young male Montagu's Harrier, and as this is the first authentic occurrence of the species in this county I think it is worth recording. I have just heard from Mr. Bartlett that it has since died, and Gardner is making a skin of it for me.—J. WHITAKER (Rainworth Lodge, Mansfield).

Rare Visitors to North Oxfordshire.—On May 17th my brother and I saw a White Wagtail, *Motacilla alba*, in a pasture-field just below this village. We were able to get close to it, and with a good field-glass could see it perfectly. From the pure pearl-grey of the back and the clearly and sharply defined black cap, throat, and breast, I think it was a male. Although I have watched carefully for this species for the last five springs, this is the first time I have been able to identify it. Two Ring Ouzels—rare visitants to North Oxon only on migration—were procured about the end of April; one which I dissected had been feeding on ivy-berries, and was extremely fat. When examining the numerous small birds scattered over a field newly drilled with spring corn on March 16th, I turned the glass on a fine male Brambling. I do not know of any other instance of this bird staying here so late in the season; the sun being unpleasantly hot it seemed strange to see a bird which we are accustomed to associate with severe winters.—OLIVER V. APLIN (Great Bourton, near Banbury).

The Larder of the Red-backed Shrike.—Early in July, whilst watching a pair of Red-backed Shrikes, in order to obtain their nest, I found close to it, in addition to a plentiful supply of bees, beetles, &c., a good-sized red-herring (not exactly impaled, as were the beetles, &c., but in such a situation in the thorn bush that it could not easily be moved) eaten away almost entirely to the bone, evidently by the birds, and leaving only the head, tail, and fins untouched. I have found the young of other birds impaled by the Shrikes before, but never a fish.—F. STANSELL (50, Hill Terrace, Taunton).

[Of course our correspondent does not intend it to be inferred that the birds, or one of them, placed the fish on the thorns unaided. Doubtless it was placed there by human agency, either by way of a joke or by way of

experiment, to see if the birds would touch it. Apparently they seem to have relished it very much, as they probably would many other things which they are unable to procure.—ED.]

Little Bittern at Colchester.—On visiting our local birdstuffer, Mr. Ambrose, a short time since, I saw a specimen of the Little Bittern (*Botaurus minutus*) on his shelf. He informed me it was picked up under the telegraph wires, having probably killed itself by contact with them. This is the second specimen captured here within the last few years.—HENRY LAVER (Colchester).

Food of the House Sparrow.—I am glad to be able to record something favourable of this bird; the apple trees this year seem to harbour a great number of the larvæ of some insect, which rolls a leaf round itself. The Sparrows have been very busy picking these leaves off the trees, and then extracting the larvæ. I think, however, that now they will cease to do good, as various seeds are obtainable. I shot two yesterday; their stomachs were full of grass seeds, and I could not detect any insect remains.—E. F. BECHER (Southwell, Notts).

Spoonbill in the South of Ireland.—On the 7th of May last an adult male Spoonbill was shot about a mile from the village of Fethard, County Wexford.—JOHN N. WHITE (Rockland, Waterford).

White Partridges.—Some years ago, among a brood of common brown Partridges on my home-farm, there was one white one. The little bird interested not only me, but my grieve and his children, who took so much interest in it that if they saw the covey go off the farm they used to drive them back; and, lest it should be killed or lost, I forbade shooting on the farm. At the proper season it paired with a brown bird, and the result was five white and several brown birds. They were so purely white as to be easily distinguished on the ground from white pigeons by their purity. Again I took care of them. One was killed by a poacher, and found its way to a birdstuffer in Elgin, from whom it was taken by Capt. Dunbar Dunbar, of Seapark, on whose manors it had been poached. I believe he still has it. The other four survived the season and paired—two white ones together, and the other two with brown ones. I hoped for a good number the next season, but they all disappeared, and there have been none since. I should not have been surprised if they had all gone at once in a covey, for they might have been netted, in spite of my keepers; but they were in pairs, and with growing crops on the ground I could not account for it.—J. BRODIE INNES (Milton Brodie, Forres, N.B.).

An Albino Cormorant.—A remarkable specimen of the Green Cormorant, *Phalacrocorax graculus*, was shot at Midyell, Shetland, on the 27th February last, and sent to me for preservation, the general colour

being of a fine creamy white. It has since been added to the fine collection of varieties of Mr. Whitaker, of Rainworth Lodge, Mansfield, Notts.—GEO. SIM (14, King Street, Aberdeen).

Hooded Crow wading.—When walking along the banks of the Liffey between Straffan and Cellridge, Co. Kildare, one afternoon in April, I witnessed a Hooded Crow wading in the river, under the following circumstances:—Three Lesser Black-backed Gulls were flying along over the river, and alighted on a low gravel bank, near which is a plantation of Scotch pine and other trees, where a pair of Hooded Crows nest annually. They were soon seen to be feeding by one of the Crows, which flew down, buffeted them, and succeeded in driving them away, and then commenced feeding on what they had left. The Gulls very soon alighted on the water, and swam pretty near to the Crow. The latter then waded out almost to the Gulls, a distance of perhaps two yards, and succeeded in driving them off for good. It then waded back to continue in peace the meal it had appropriated. I think it waded into as deep water as it dare to; its legs, so far as I could see, were entirely under water, as was also the end of its tail. My friend Mr. W. Banks, who was with me, also witnessed this remarkable occurrence.—J. E. PALMER (Lyons Mills, Straffan, Co. Kildare).

[The circumstance of the Crow wading does not seem to us so remarkable as its bold attack on three such large birds as Lesser Black-backed Gulls. We have repeatedly observed both the Carrion Crow and the Hooded Crow wading along the banks of tidal rivers on an ebb tide in search of food which floated on the water or lay just below the surface. Mussels, the shell of which they can easily break with their powerful bills, seem to be a favourite food with them.—ED.]

Terns and Gulls inland in Yorkshire.—Whilst on Strensall Common, near York, on the 11th May last, I observed four Common Terns, *Sterna fluvialis*, hovering over one of the "splashes" there. This is, I believe, the first time these birds have been recorded as occurring at Strensall during the breeding season. The Black-headed Gull, *Larus ridibundus*, are this year breeding in larger numbers than ever.—W. HEWETT (York).

Great Reed Warbler at Ringwood, Hants.—Your readers will be interested to hear that on the 3rd June last a fine specimen of the Great Reed Warbler, *Acercephalus turdoides*, was shot by Mr. G. F. Hart, who takes charge of my fishery near Ringwood. He found it by the river side in a rank growth of sedge, reed, water hemlock (*Ænanthe crocata*), and willow. It has been preserved for me, and proved on dissection to be a male.—T. J. MANN (The Grange, Bishops Stortford, Herts).

[We have been favoured with a sight of this bird, which Mr. Mann very kindly brought for our inspection, and there is no doubt that it has been correctly identified.—ED.]

Habits of the Magpie.—There is a remarkable instance of instinct displayed by the common Magpie which I have not seen noticed, although it has long attracted my attention, and is well known to farmers in the West of Scotland. This bird may be seen each year, on the first Sunday of March (old style), very busily employed carrying small twigs of branches to renew its old nest or form a new one for the approaching breeding season. This particular day appears to be appointed for taking formal possession of the premises, as no more work whatever is done for some weeks after. The instinct which enables a bird to take the sun's altitude on a particular day in March is certainly a very rare gift, but any person who wishes to satisfy himself of its truth, and who lives in a locality where these birds breed, has only to rise early on Sunday, March 16th, this year, to see them at work for himself. It would be interesting to know within what degrees of latitude this particular day is observed by these birds.—WM. BROWN.—*From 'Nature.'*

Instinct of Birds.—I have read Mr. Brown's letter relative to the instinct shown by Magpies in Scotland as to the time for commencing their nest-building, which goes so far as to assume that this particularly cunning bird is capable of fixing a certain day in March (the Sunday after the 16th, as I remember) as the invariable time to start the nest. And the writer observes that it would be well to ascertain if difference of latitude made any difference in the Magpies' calculation. Now I live in the south-east of Ireland, a good many degrees south of your correspondent's Scotch Magpies' locality, and it so happens that I have for the last twenty years observed the nest-building of Magpies, who have enjoyed undisturbed possession, and who invariably build in the trees close to my house. It is curious that this colony (if a single pair may be so called) never increases. Four young "Mags" are brought out every year, but though I have observed congregations of ten or fourteen at times, the breeding birds never exceed two. The young birds never, like Rooks, join a colony near their paternal nests, but are shipped off to new localities. I could mention many traits of my Magpies' instinct—"their tricks and their manners"—but will confine myself to the nest-building. They never repair or re-occupy an old nest. A new one is constructed every year, and always, each year, in a different tree. The nest-building is a serious labour, and takes a long time. So they begin early in *February*, selecting the sites often with much deliberation. The work is entered on very early in the morning, and the "Mags" seldom work in the daytime. About the end of March this domed nest with its two openings is finished, and the laying of eggs commenced. I am quite certain that the middle of March is not the time of beginning the nest, and this is important, as the claim set up for the Magpies' instinctive knowledge of dates therefore falls to the ground. I do not conceive it possible to prove that in this particular Magpies have a more

highly developed instinct than most other birds; all have their normal time of nesting, although there may be cases of abnormally late or early building; but as to the Magpies or any other bird being able to fix dates exactly to the day, it is unproved and incredible.—JAMES GRAVES (Inisnag, Stonyford, Co. Kilkenny).

I think it was about the year 1844 that the Duke of Argyll desired my late father, his factor, to preserve game in the district of Kintyre, Argyllshire. If any steps in this direction had been taken by other proprietors, they were very irregular. My memory goes back to about 1846 and 1848, and at that time the Grouse of Kintyre "sat like stones"; they might be shot to dogs from the first to the last day of the season; in fact it was often difficult to get the birds up. With this preservation Grouse increased enormously,—and therefore the food supply of the people,—to such an extent that the late Sir John Cunningham and my father shot, on one 12th of August, seventy-two brace of Grouse. Sir John was a very old man, and insisted on loading his own gun, an old muzzle-loader. My father never shot hard. Now I do not believe any two men with two guns and loaders could do this in the same district with all the improvements in arms and dogs; whilst I have heard my father say that seven brace was a good bag when he was young, before game-preserving. Grouse yet sit pretty well in Kintyre, and I believe this is the case because it was one of the last districts to preserve and shoot; but the birds are every year becoming wilder, and now in the month of September it is useless to take dogs on the hill, and for two years we, like others, have had to drive them. I account for this by an alteration in instinct, and I am as sure as any one can be, from observation and the opinion of competent persons, that it is *progressive instinct in successive generations*. Formerly the great enemies of the Grouse were Ravens, that took their eggs and young birds; Foxes, Polecats or Marten Cats, and Wild Cats, that took them at *night* on the ground; and hawks, that took them on the wing during the day. When man stepped in and altered the balance of Nature, the

Bird that up and flew away,
He lived to breed another day.

No hawk was there to knock him down. He found from experience that flying away before man and his dog came near gave him safety; and his children that inherited the wit or instinct or power of turning heather into nerve-force or intelligent thought—or whatever the straw-splitters like to call it—lived; whilst his brother, that inherited the qualities which kept him hiding in the heather, was shot when forced up. I had this summer ample corroboration of this theory. About eight years ago I was shooting in the island of Rum; the Grouse were not preserved and were extremely tame, so tame in September and October that I had to run after them to

make them take the wing, and it was new to dogs. Last year I again shot in the island, and I observed the same tameness in one part of the island, but in another district I observed the Grouse were larger, darker, and much wilder. I was puzzled with this until I found out that the late tenant had three years before turned down some English Grouse, and in the district where they were so turned down the Grouse were very wild.—DUNCAN STEWART (Knochrioch).

Mr. Graves says, "As to the Magpies or any other bird being able to fix dates exactly to the day, it is unproved and incredible." I do not know what may be the case in regard to birds' nest-building, but I can give two instances of the regularity with which birds arrive at certain localities *en route* northward, whatever may be the state of the weather. During a ten years' residence on the shores of Hudson's Bay the first Canada goose of the spring migration was seen and generally shot on April 23rd. At Toronto, on Lake Ontario, large flocks of a pretty little Plover called the "Black-heart," from a black patch on its breast, pass along the islands, flying northward, on St. George's Day (April 23rd), and are seldom or never seen even a day before or a day after that date. The poor little birds have a sad time of it for six or eight hours, as a number of sportsmen go out for the occasion and knock them down by the half-dozen or more at every shot. In this case, as in the other, wind and weather appear to cause no difference.—JOHN RAE (4, Addison Gardens).—From 'Nature.'

Golden Plover with white Primaries.—On the evening of June 28th, while searching for young Golden Plovers in some rough ground towards the base of one of "Macleod's Tables," in Skye, it struck me that one of the old birds seemed unusually light in colour. On shooting it I found that the greater part of the primaries were white. It proved to be a male in good condition.—H. A. MACPHERSON (Carlisle).

International Ornithological Congress at Vienna.—After a long delay we have at length received a copy of the resolutions which were passed at the First International Ornithological Congress at Vienna (see pp. 139, 188), of which the following is a translation:—

"The First International Ornithological Congress assembled at Vienna resolves:—

"1. To elect a standing international committee for the appointment of bird-observing stations, of which the Crown Prince is asked to take the protectorate.

"2. To ask the Austro-Hungarian Government to make representations to all those countries not represented in this Congress with a view to their arranging for ornithological observation stations, and to their notifying the president of this committee of proper persons interested in the matter.

"3. To request the delegates of the different States here represented

to suggest to their respective governments as follows:—*a.* The arrangement, so far as may be possible, of ornithological observation stations. *b.* The granting of money to carry on the business of the stations and for the publication of the annual record of their observations of birds; also to appoint local committees in their various States to be under the general direction of the president of the international committee.

“4. To request the committees to work after a common plan, as follows:—*a.* The ornithological observations will be spread over the entire inhabited globe, but in their first lines (*in erster linie*) will be attempted in Europe. *b.* The observations will be made, so far as possible, on one plan, for which the Austro-Hungarian and German will serve as a basis. *c.* Upon this basis (see the German and Austro-Hungarian reports) the communications coming in from the different States are to be worked up and systematically arranged, if possible, with the same system of nomenclature, and always with the same scientific names. *d.* A check-list of the native birds of each country is to be kept after the plan of that made for Austro-Hungary by E. von Homeyer and von Tschusi, the particular local names being added. *e.* Every effort should be made to enlist the interest in the observations of academies, natural-history societies, museums, &c.; also consulates, Catholic and Protestant missions, meteorological stations, journals of natural science, teachers, foresters, inspectors of lighthouses, &c. *f.* If skilful observers are at hand drawings should be made of all species of birds. Where this cannot be done it is to be left to the discretion of the committees to name some species well known to all lovers of Nature for special examination. *g.* It would be desirable at the same time to note anything unusual in the animal and vegetable kingdoms; also the meteorological phenomena,

“5. In the international committee each country is to be represented by one or more delegates, according to its size and importance. The committee has the right to appoint representatives to serve for those countries not represented in this Congress.”

FISHES.

Blackfish on the Devonshire Coast.—On the 20th June last four specimens of that scarce fish on the British coast, *Pompilus centrolophus*, were caught in a net off Penlee Point, at the entrance of Cawsand Bay, not far from Plymouth. The head in this species is small, and its body of graceful form, much resembling that of a salmon-peal; back and fins very dark, its general colour purplish black or dull neutral tint, shading lighter towards the belly, a silvery sheen showing, as it were, through the more sombre tint; the iris white, contrasting finely with the dark head and face. When dry the scales of these fish appeared to be marked with a small light oblong spot, forming rows of stripes both above and below the lateral line.

The length of the larger of two specimens examined by me was exactly one foot, and its depth three inches; the other somewhat less. Both are now preserved in spirit in the Museum of the Plymouth Institution, and the other two were, I believe, sent to Exeter for the Albert Memorial Museum. This species, like the Pilot-fish, is said to follow wrecks and large Sharks towards the shore, but I have not heard of either having been lately found or seen on this part of the coast.—J. GATCOMBE (Durnford St., Stonehouse).

Ichthyological Notes from Mevagissey, Cornwall.—April 26th.—Young Flounders, *Platessa flesus*, first seen for the season in our harbour; not larger than rice-grains, with eyes on each side of their heads, and swimming on the surface of the sea. My son also noted them at Portmelon beach, about a mile from here. They are to be seen every year about this date, and yet I have not been able to find the spawn in the sac before the young break the eggs. April 27th.—Sea Urchins (*Spatangus*) found at Portmelon beach in great quantities about six inches below the surface of the sand near low water, and congregated together in a shoal near the west rocks in about fifteen square feet. Every one has a hole in the sand communicating with the sea. The strangest circumstance is that they appear to be eating the sea-sands; possibly the worms and other marine life which the sands contain may sustain the life of the creatures, and not the sand itself. April 29th.—Mackerel boats were fishing from twenty to forty miles from land last night. Some landed as much as 2000 Mackerel; fish rather small, but all were full of roe—should think many would spawn in a fortnight. Quantities of minute Crustacea in the stomachs of all of them; I estimated that one had full thirty thousand of them stuffed tightly in his stomach-sac. April 30th.—Some Sea Bream, *Pagellus ventrodontus*, for the first time for the season; and Garfish, *Esox belone*, with well-developed roes in them. May 1st.—Joseph Elvins caught some hundreds of Herrings in his seine. Found they were feeding on minute young Herrings of about an inch long. One large Herring had eaten full fifty little ones. Dr. Day confirmed the fact that they were young Herrings; I sent him several, and a large Herring with a roe in it. The fish should have spawned in February, but could not do so in consequence of the vent being obstructed; the eggs had not yet broken out into the intestines, but were on the point of doing so; the eggs looked white and sickly. I have known Mackerel and Ling in this state; in the Mackerel these scatter among the intestines. I believe I have seen three years' eggs in one fish. June 12th.—Noted a Sandy Ray (Couch), female. Couch's figure is also that of a female. I have never yet seen a male of this species. Picked-dog-fish (Couch) are full of young ones and eggs. I believe I have seen them in this state in every month since December last. Took several large red parasites from gills of the Bib, *Morrhua lusca*. These must be new to science, for neither Couch nor Day mention them.

I have put them in spirits for further consideration. June 13th.—Pilchards are spawning about twenty miles from land. Congers full of roe; grains too small to be seen with the eye, but very distinct as seen through a magnifying glass. Noted this day Crustacea, *Rocinila dannoniensis*. These have been scarce on the rocks for some years; in some seasons they come in multitudes, and then the Sea-bream come and devour them. June 14th.—Noted Crustacea, *Couchea cylandricea*, in stomach of Conger. Mounts Bay boat here with three thousand Mackerel, at 6s. 6d. per 120. Noted they had a very green appearance. Men report that where the Mackerel are most abundant the sea has a very green appearance. This no doubt is caused by the food of the Mackerel being of a green colour and in such quantities as to alter the colour of the sea. Mackerel off our coasts, when at their best, are of a very blue colour. Saw a Blue Shark, *Squalus glaucus*, for the first time for the season. The Mackerel brought from Mounts Bay were full of small Crustacea in stomach, but very different in form from those caught off our coasts. June 16th.—Messrs. Fox, of Falmouth, directed my attention to the immense quantities of Crustacea in stomach of Mackerel caught off the Scilly Isles. June 20th.—Had large Mounts Bay Mackerel in Sandon Factory, full 1500, and noted they were full of roe. Took roe-sac from one; weight five ounces and a half. Found 238 eggs in one grain; the total number of ova in this Mackerel would be 560,000. Noted Sandy Ray (Couch), again a female, and Chads (young Sea-bream) for the first time for the season. June 24th.—First Pilchard landed for the season here, from spawn caught about fifteen miles from land. The whole family of Garfish, *Esox belone*, have now finished spawning; proportion of sexes, about three females to one male. Male much the smallest. These are very vicious fish, and use their beaks violently. Noted that several of the males are very much lacerated in the sides, evidently caused by the beaks of the Gars.—MATHIAS DUNN (Mevagissey, Cornwall).

Opah-fish in Shetland.—A fine specimen of the Opah-fish, *Lampris guttata*, was taken off Unst, Shetland, on May 22nd, and forwarded by the fishery officer to Prof. Ewart, University of Edinburgh. It measured four feet in length and over two feet in depth, and has been handed over to Prof. Turner, to enable him to complete an account of the fish begun some years ago, when he received a somewhat smaller specimen from the Moray Firth.

CRUSTACEA.

Abnormal Growth in Cancer pagurus.—I have received a specimen of the Common Edible Crab, *Cancer pagurus*, a female, measuring four inches across the carapace, and therefore mature, in which the right pedipalps were normal, but instead of the usual left pedipalps a small "claw" was developed, with arm, wrist, hand, and fingers all clearly defined, the

two ordinary claws being present and in perfect condition. I do not usually note monstrosities, but I do so in this case because it shows the tendency of any part of a Stalk-eyed Crustacean to assume the form of any other part.—THOMAS CORNISH (Penzance).

ARCHÆOLOGY.

Meaning of the word "Gaunt" applied to the Great Crested Grebe.—Attention having been directed (Zool. 1879, p. 468) to the fact that in the Co. Durham formerly (1343—1361) land was held by the tenure *inter alia* of paying one "wode henne" yearly to the Bishop of Durham for the time being, it may be worth while to mention that in the reign of Edward I. land was held in the Co. Bucks by the tenure of finding (amongst other things) a couple of Grebes. William, son of William de Alesbury, held three yardlands of the King in "Alesbury" by the serjeanty of finding straw in winter and rushes in summer for the King's bedchamber, and providing (amongst other things) two Grebes (*duas gantas*), which services were to be performed thrice a year if the King should happen to come three times to "Alesbury," and not oftener. Blount, who cites this tenure *sub voce* "Aylesbury," renders *gantas*, geese; but whenever geese were intended *anser*es is the word found in the Court Rolls. Bearing in mind the use of the soft satiny plumage for the trimming of robes and mantles, I have no doubt that by *duas gantas* we are to understand "two gaunts," *i.e.* two grebes. "Gaunt," a provincial name for the Great Crested Grebe, in the Sussex dialect signifies to yawn (Ang. Sax. *geanian*), and I have frequently observed in the grebes and divers a spasmodic action analogous to gaping or yawning.—J. E. HARTING.

SCIENTIFIC SOCIETIES.

ZOOLOGICAL SOCIETY OF LONDON.

June 17, 1884.—Prof. W. H. FLOWER, LL.D., F.R.S., President, in the chair.

Mr. H. Seebohm exhibited and made remarks on some specimens of rare Asiatic and European birds, and called special attention to examples of a newly-discovered Russian species, *Bonasa griseiventris* (Menzier).

Mr. Sclater exhibited the knob of the culmen of the beak of a Rough-billed Pelican (*Pelecanus*), which had been shed by the bird in the Society's Gardens last autumn; and called attention to the fact that on coming into breeding-plumage again this summer the bird had grown another knob.

Mr. Sclater also called the attention of the meeting to a very singular habit of a Vasa Parrot, *Coracopsis vasa*, as observed in the Society's Gardens.

Mr. F. Holmwood gave an account of his observations on the employment of the *Remora* by native fishermen of Zanzibar for the purpose of catching Turtle and large fishes.

Mr. R. Bowdler Sharpe read some further notes on the new Corsican Nuthatch, *Sitta Whiteheadi*, in continuation of former communications on the same subject.

A communication was read from Dr. G. Hartlaub, in which he gave the description of a new species of Creeper of the genus *Salpornis*, discovered in Eastern Equatorial Africa by Dr. Emin Bey. The author proposed to name it, after its discoverer, *Salpornis Emini*.

Prof. Flower read a note on the names of two genera of *Delphinidæ*, which he found it necessary to change.

A communication was read from Dr. Camerano, giving a summary of the distribution of the native Batrachians in Italy.

Mr. G. A. Boulenger gave the description of a new variety of Lizard of the genus *Lacerta* from South Portugal, which he proposed to describe as *Lacerta viridis*, var. *Gadovii*.

A communication was read from Mr. H. O. Forbes, containing remarks on a paper by Dr. A. B. Meyer on a collection of birds from the East-Indian Archipelago, with special reference to those described by him from the Timor-Laut group of islands.

Lieut.-Col. C. Swinhoe read a paper on some new and little-known species of butterflies of the genus *Teracolus*. The author referred to and described twenty-two species, sixteen of which were new to science and the others very rare.

A communication was read from Mr. Francis Day on the occurrence of *Lumpetus lumpetiformis* off the east coast of Scotland.

Mr. Oldfield Thomas read a paper upon the *Muridæ* collected by M. Constantin Jelski, near Junin, in Central Peru, during the years 1870-73. The collection consisted of ninety-two specimens, representing twelve species, mostly belonging to the genus *Hesperomys*, the nine subgenera of which were now arranged and re-defined. One species and two varieties were described as new under the names of *Rheithrodon pictus*, *Hesperomys laticeps*, var. *nitidus*, and *H. bimaculatus*, var. *lepidus*.

A communication was read from Mr. W. L. Distant, describing the Rhynchota collected by the late Mr. W. A. Forbes on the Lower Niger. The collection contained examples of twelve species, eleven of which belonged to the Hemiptera and one to the Homoptera. Two species appeared to be undescribed.

Prof. Mivart read a paper on the development of the individual and of the species as forms of Instinctive Action.

This meeting closes the present session. The next session (1884-1885) will commence in November.—P. L. SCLATER, *Secretary*.

ENTOMOLOGICAL SOCIETY OF LONDON.

June 14, 1884.—J. W. DUNNING, Esq., M.A., F.L.S., &c., President, in the chair.

Capt. Richard Holt (Heathfield Lodge, Granville Road, Wandsworth, S.W.) and W. F. de Vismes Kane, Esq., M.A., M.R.I.A. (Sloperton Lodge, Kingstown, Ireland) were balloted for and elected Members of the Society.

Mr. G. Coverdale exhibited a box containing many Micro-Lepidoptera and several Macros set, on pith with gum, without pinning, according to his new process, described in the 'Entomologist' for June (xvii. 131). Messrs. Dunning, M'Lachlan, and Fitch made some remarks thereon.

Mr. R. M'Lachlan exhibited galls on the roots of various species of *Cattleya*, similar to those exhibited at the last meeting which produced *Isosoma orchidearum*, Westw., which had been received from the Hon. and Rev. J. T. Boscawen. He also exhibited the extraordinary heliciform lepidopterous larva-cases from East Africa—about 200 miles inland from Zanzibar—which he had described and figured in Ent. Mo. Mag., vol. xxi., p. 1; also, from the same locality, several other cases of *Psychidæ*, one species bearing a remarkable resemblance to a *Dentalium*; and an egg-case, probably of a Mantis, very similar to those exhibited at the last December meeting but not identical, these being neither so large nor so delicate and transparent.

Mr. M'Lachlan also exhibited nearly 100 microscopic slides of British Aphides, prepared by the late Francis Walker in 1847, which had been presented to him by Mr. P. Hubert Desvignes, son of the late Mr. Peter Desvignes, who was one of the original members of the Society; these slides evinced great care and skill in microscopic mounting, considering that nearly forty years had elapsed since they were prepared.

Mr. T. R. Billups exhibited several specimens of *Cremastogaster scutellaris*, Oliv., captured while running about on the pavement of Church Street, Greenwich. As there was a cork importer's in the immediate neighbourhood of the capture, and as the ants commonly nested in bark, their presence was not difficult to account for.

Mr. W. C. Boyd exhibited some remarkably fasciated strawberry plants from his garden at Cheshunt; it was thought that the attacks of a *Phytoptus* had caused the abnormal growth.

Mr. W. H. Patton communicated some "Notes on the Classification and Synonymy of Fig-Insects."

Mr. F. Moore communicated "Descriptions of new species of Indian Lepidoptera Heterocera, mostly from specimens in the British Museum."—E. A. FITCH, Hon. Sec.

